SATO
DCS & Labelling Worldwide

Service Manual

For printer model:

CG4 Series

CG408DT
CG412DT
Direct Thermal Type

CG408TT
CG412TT
Thermal Transfer Type

Please read this Service Manual before using this product.
Keep this document available for future reference.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

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Version: GBS-CG4-01rA-15-12-09SM

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1

INTRODUCTION

1.1 ABOUT THIS MANUAL

This service manual provides all of the information required for printer maintenance and repair by SATO approved personnel. For the repair technician, this manual is intended to compliment, and to be used as an extension of operator manual.

This manual also incorporates the use of special information boxes. Examples of these boxes and the type of information provided in each, are below.

> WARNING:
> **PROVIDES INFORMATION THAT, IF UNHEEDED, MAY RESULT IN PERSONAL INJURY.**

> CAUTION:
> PROVIDES INFORMATION THAT, IF UNHEEDED, MAY RESULT IN EQUIPMENT DAMAGE.

> NOTE: Provides helpful hints to assist in performing the tasks at hand.

A comprehensive Table Of Contents provided at the front of this manual facilitates rapid movement within. The contents identify the different unit sections and their respective sub-sections. Each references the page number of their commencement.

The pages of this manual has embedded headers and footers to assist the user in identifying his or her exact position within the manual. The header provides the section number followed by its name. The footer identifies the product and the page number.

Page enumeration is two-part with each separated by a hyphen. The first character set references the section number and the second identifies the page number. Page numbers begin with the numeral (1) one at the commencement of a new section and ascends sequentially.

1.2 FEATURES OF THE PRINTER

The CG4 Series is 4 inch Compact Desktop printer (Thermal Transfer or Direct Thermal). With a 32-bit RISC CPU, 4 ips print speed, and 4MB Flash Memory, the CG4 Series is an economical printer with numerous features making it suitable for a wide range of applications. The key features of the CG4 Series are:

- High Print Resolution with crisp printing quality (203dpi or 305dpi)
- Multiple Interface
- Cutter and Dispenser Printer Options
- Linerless Label Support
- Easy Media Loading
- Standalone Capability using Keypad
- Tool-less changing of print head and platen roller for easier maintenance
- Codepage Support and Emulations
- Anti-Microbial casing is ideally suited for clinical environments or food processing industry
- Safety Top Cover Latch
- Distinctive Chassis color

1.3 PARTS IDENTIFICATION

Front view

① **Operator panel**

It consists of two contact buttons and two LED indicators (green and red).

② **Top cover**

Open this cover to load the media and ribbon.

③ **Cover open/close latch**

Pull these latches on both sides of the printer forward to open the Top cover of the printer.

④ **Media ejection slot**

Opening for media output.

⑤ **POWER button**

Press this button to turn the power on or off.

⑥ **FEED/LINE button**

Press this button to select the printer status (online/ offline) or to feed the media.

⑦ **ERROR LED indicator**

The LED lights or blinks red when an error is detected in the printer.

During printer configuration setting, the ERROR indicator responses in conjunction with the ON LINE (POWER) indicator to show the modes of the printer.

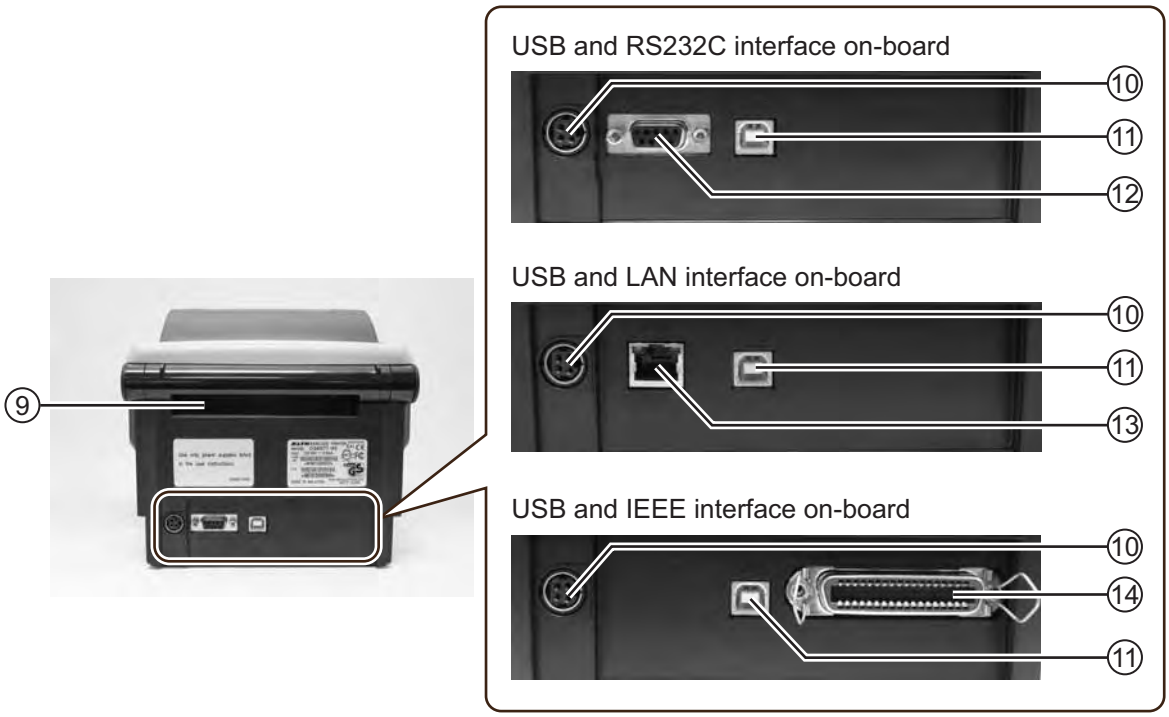
⑧ **ON LINE (POWER) LED indicator**

The LED lights green when the printer is online and blinks green when the printer is offline.

During printer configuration setting, the ON LINE (POWER) indicator responses in conjunction with the ERROR indicator to show the modes of the printer.

1.3 PARTS IDENTIFICATION (cont'd)

Back view



⑨ **Media inlet**

An opening for Fan-folded media or media from unwinder to feed in to the printer.

⑩ **DC input power terminal**

Supplies power to the printer by inserting the power cable via the AC adapter.

⑪ **USB interface terminal**

To connect printer to the host computer using the USB interface.

⑫ **RS-232C interface terminal**

To connect printer to the host computer using RS-232C interface.

Or, to connect the optional Keypad, Scanner or Smart keyboard to the printer.

⑬ **LAN interface terminal**

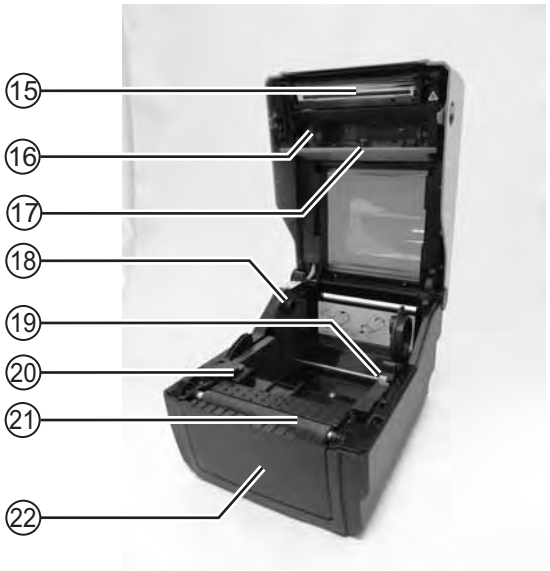
To connect printer to the host computer using LAN interface.

⑭ **IEEE interface terminal**

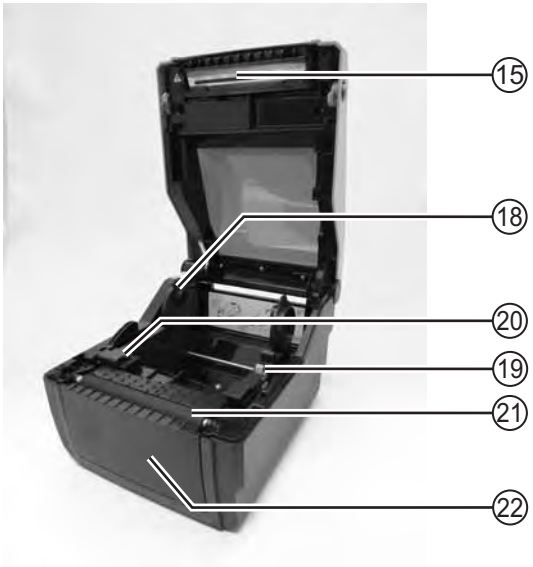
To connect printer to the host computer using IEEE interface.

1.2 PARTS IDENTIFICATION (cont'd)

Internal view when Top cover is opened



CG408TT/ CG412TT



CG408DT/ CG412DT

⑮ **Print head**

This component is used to print on the media. Perform maintenance at regular intervals.

⑯ **Ribbon unit**

Used to load the ribbon and wind up the used ribbon.

⑰ **Pull out lever**

This is used to pull out the ribbon unit from the top cover for ribbon loading.

⑱ **Roll media holder**

To hold the roll media.

⑲ **Media guide slide lever**

Set to meet the size of the media used.

⑳ **Media guide and I-Mark/ Gap sensor**

A guide for the media to feed properly.

Detects the I-Mark on the media or gap of the label.

㉑ **Platen roller**

This roller feeds the media. Perform maintenance at regular intervals.

㉒ **Optional device compartment**

Used to install optional cutter, dispenser or linerless (Non sepa) unit.

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2

GENERAL SPECIFICATIONS

2.1 PRINTER BASIC SPECIFICATIONS

MODEL NAME	CG408 DT	CG412 DT	CG408 TT	CG412 TT

PHYSICAL CHARACTERISTICS		
Width	179 mm (7.05”)	
Depth	238 mm (9.37”)	
Height	173 mm (6.81”)	
Weight	1.7 kg (3.7 lbs.)	1.9 kg (4.19 lbs.)

POWER SUPPLY (AC ADAPTER)	
Input Voltage	100-240 V AC, +/-10%, 50/60 Hz (Full range)
Output Voltage	19 V DC, +/-5%, 3.86A
Power Consumption	At peak times: 50 Watts During standby: 2.5 Watts

ENVIRONMENTAL (EXCLUDING MEDIA)	
Operating Temperature	4° to 38°C (39.2 to 100.4°F)
Storage Temperature	-10° to 60°C (14 to 140°F)
Operating Humidity	30 to 80% RH, Non-condensing
Storage Humidity	15 to 85% RH, Non-condensing

PRINT				
Method	DT models: Direct Thermal only		TT models: Thermal Transfer and Direct Thermal	
Print Speed (selectable)	50, 75 or 100 mm/second 2, 3 or 4 Inches/second (Setting: 2, 3, 4) *Maximum print speed varies depending on the of media used.			
Resolution	8 dots/mm (203 Dots Per Inch)	12 dots/mm (305 Dots Per Inch)	8 dots/mm (203 Dots Per Inch)	12 dots/mm (305 Dots Per Inch)
Maximum Print Width	104 mm (4.09”)			
Maximum Print Length	300 mm (11.81”)			

MODEL NAME	CG408 DT/ CG408TT	CG412 DT/ CG412TT

MEDIA (Be sure to use media manufactured or certified by SATO)	
Type	Direct Thermal / Thermal Transfer depending on print model (DT or TT) Roll stock or Fan-fold
Wind Direction	Roll stock: Face In or Face out winding
Roll and Core Diameter	Maximum outer diameter: 128 mm (5.04”) with Inner core diameter: 40 mm (1.5”) * Inner core diameter: 19.05 mm (0.75”) with maximum outer diameter: 110 mm (4.33”) can be accepted, but there is no performance guarantee.
Fanfold Max. stack height	118 mm (4.65”) (external supply)
Size	**Label** Continuous — **Pitch**: 7 to 300 mm (0.27” to 11.8”); **Pitch including liner**: 10 to 303 mm (0.39” to 11.93”); **Width**: 22 to 107 mm (0.86” to 4.21”); **Width including liner**: 25 to 110 mm (0.98” to 4.33”) Cutter — **Pitch**: 22 to 300 mm (0.87” to 11.8”); **Pitch including liner**: 25 to 303 mm (0.98” to 11.93”); **Width**: 22 to 107 mm (0.87” to 4.21”); **Width including liner**: 25 to 110 mm (0.98” to 4.33”) Dispenser — **Pitch**: 22 to 100 mm (0.87” to 3.93”); **Pitch including liner**: 25 to 103 mm (0.98” to 4.05”); **Width**: 22 to 107 mm (0.87” to 4.21”); **Width including liner**: 25 to 110 mm (0.98” to 4.33”) Tear-off — **Pitch**: 22 to 300 mm (0.87” to 11.8”) *1; **Pitch including liner**: 25 to 303 mm (0.98” to 11.93”); **Width**: 22 to 107 mm (0.87” to 4.21”); **Width including liner**: 25 to 110 mm (0.98” to 4.33”) Linerless — **Pitch**: 25 to 100 mm (0.98” to 3.93”) *1; **With**: 25 to 110 mm (0.98” to 4.33”) **Non-adhesive paper** Continuous — **Pitch**: 10 to 303 mm (0.39” to 11.93”) *1; **Width**: 25 to 110 mm (0.98” to 4.33”) Cutter — **Pitch**: 25 to 303 mm (0.98” to 11.93”); **Width**: 25 to 110 mm (0.98” to 4.33”) Tear-off — **Pitch**: 25 to 303 mm (0.98” to 11.93”) *1; **Width**: 25 to 110 mm (0.98” to 4.33”)
	*1 Media using small pitch must be torn by hand. • The above size may be limited by use conditions, such as type of paper, usage environment, and application. • When using the dispenser mode, restrictions apply to the maximum paper length according to paper installation conditions.
Thickness	0.06 to 0.19 mm (0.0024” to 0.0074”)

MODEL NAME	CG408 DT	CG412 DT	CG408 TT	CG412 TT

RIBBON (Be sure to use ribbon manufactured or certified by SATO)		
Wind Direction	—	Face Out
Winding Method		Paper core
Roll Diameter		Maximum outer diameter: 38 mm (1.4”)
Core Diameter		Inner core diameter: 12.7 mm (0.5”)
Length		Max. 100m (328 ft.), Do not exceed the maximum outer diameter.
Width		Use only 110mm +/- 0.5mm (4.33” +/- 0.01”)

PROCESSING	
CPU	32 Bit RISC-CPU 133MHz
Flash ROM	4 Megabytes
SDRAM	8 Megabytes

PRINTER LANGUAGE	
Standard	SATO Barcode Printer Language (SBPL)

INTERFACES	
Standard Configurations	Select one of the following. (The factory will provide the unit with the selected interface.) 1) USB 2.0 (Type B) with RS-232C (D-SUB 9-pin type) or 2) USB 2.0 (Type B) with LAN (10BASE-T/100BASE-TX Automatic Switching) or 3) USB 2.0 (Type B) with IEEE1284 *The RS-232C connector can be used to connect the printer to a computer, an optional keypad, Smart keyboard or Barcode scanner.

SENSING		
Gap (Transmissive)	Sensitivity Adjustable	
I-Mark (Reflective)	Sensitivity Adjustable	
Cover Open	Fixed	
Ribbon End	Not available	Fixed (Only available for Thermal Transfer model)
Dispenser	Fixed (Only available if installed)	
Linerless label sensor	Fixed (Only available if installed)	

LABEL ISSUING MODES	
	Standard: Continuous mode, Tear -off mode, Sensor off mode
	Optional mode: Dispenser mode, Cutter mode, Linerless (Nonsepa) mode

MODEL NAME	CG408 DT	CG412 DT	CG408 TT	CG412 TT

SELF-DIAGNOSIS		
	Cover Open Detection Paper End Detection Test Print Cutter error (Only available if installed)	Cover Open Detection Paper Detection Test Print Ribbon end Detection Cutter error (Only available if installed)

CHARACTER FONT CAPABILITIES				
BITMAP FONTS				
U	5 dots W x 9 dots H (Alphanumeric characters and symbols)			
S	8 dots W x 15 dots H (Alphanumeric characters and symbols)			
M	13 dots W x 20 dots H (Alphanumeric characters and symbols)			
WB	18 dots W x 30 dots H (Alphanumeric characters and symbols)			
WL	28 dots W x 52 dots H (Alphanumeric characters and symbols)			
XU	5 dots W x 9 dots H (Alphanumeric characters and symbols)			
XS	17 dots W x 17 dots H (Alphanumeric characters and symbols)			
XM	24 dots W x 24 dots H (Alphanumeric characters and symbols)			
XB	48 dots W x 48 dots H (Alphanumeric characters and symbols)			
XL	48 dots W x 48 dots H (Alphanumeric characters and symbols)			
OA Font (OCR-A)	15 dots x 22 dots (Alphanumeric characters and symbols)	22 dots x 33 dots (Alphanumeric characters and symbols)	15 dots x 22 dots (Alphanumeric characters and symbols)	22 dots x 33 dots (Alphanumeric characters and symbols)
OB Font (OCR-B)	20 dots x 24 dots (Alphanumeric characters and symbols)	30 dots x 36 dots (Alphanumeric characters and symbols)	20 dots x 24 dots (Alphanumeric characters and symbols)	30 dots x 36 dots (Alphanumeric characters and symbols)
KANJI FONTS				
	Supported by downloading one of the following kanji fonts. 1) Simplified Chinese (2.6MB) Gothic type GB2312 (24 x 24 dot) 2) Korean (1.6MB) Gothic type KSX1001 (16 x 16 dot) Mincho type KSX1001 (24 x 24 dot)			
OUTLINE FONTS				
	Alphanumeric characters and symbols			
CHARACTER CONTROL				
Magnification	Expansion up to 12 x in either the vertical or horizontal			
Rotation	0°, 90°, 180° and 270°			

MODEL NAME	CG408 DT	CG412 DT	CG408 TT	CG412 TT

BARCODE CAPABILITIES	
Linear Bar Codes	UPC-A/UPC-E, EAN8/13, CODE39, CODE93, CODE128, GS1-128 (UCC/EAN128), CODABAR(NW-7), ITF, Industrial 2 of 5, Matrix 2 of 5, BOOKLAND, MSI, POSTNET, GS1 DataBar (RSS) * GS1 DataBar is new version of RSS-14.
Two Dimensional codes	PDF417 (Ver.2.4), MAXI code (Ver.3.0), QR code, GS1 DataMatrix (ECC200)
Composite Symbols	EAN-13 Composite (CC-A/CC-B) EAN-8 Composite (CC-A/CC-B) UPC-A Composite (CC-A/CC-B) UPC-E Composite (CC-A/CC-B) GS1-128 Composite (CC-A/CC-B/CC-C) GS1 DataBar Composite (CC-A/CC-B) GS1 DataBar Truncated Composite (CC-A/CC-B) GS1 DataBar Stacked Composite (CC-A/CC-B) GS1 DataBar Stacked Omni-Directional Composite (CC-A/CC-B) GS1 DataBar Limited Composite (CC-A/CC-B) GS1 DataBar Expanded Composite (CC-A/CC-B) GS1 DataBar Expanded Stacked Composite (CC-A/CC-B) * GS1 DataBar is new version of RSS-14.
Ratios	1:2, 1:3, 2:5, User definable bar widths
Magnification	1 x to 12 x
Rotation	Parallel 1 (0°), Parallel 2 (180°), Serial 1 (90°) and Serial 2 (270°)

STANDARD FUNCTIONS	
	1) Status return function 2) Graphic function 3) Sequential number function 4) Form overlay function 5) Custom character registration function 6) Black/white inversion function 7) Ruled line function 8) Format registration function 9) Zero slash switching function

MODEL NAME	CG408 DT	CG412 DT	CG408 TT	CG412 TT

HARDWARE AND RELATED	
Operation keys	POWER and FEED/LINE buttons
Indicators	ON LINE (POWER): Green LED ERROR: Red LED
Buzzer	Built-in buzzer • On/ off switchable buzzer (specified by command) • No volume control function available
Surface Treatment	Antibacterial finishing for external cover and operative parts. Tested according to JIS Z 2801 standard

OPTIONS	
	1) Cutter Unit 2) Dispenser Unit 3) RTC kit (Calendar IC) 4) Linerless (Nonesepa) Unit 5) Keypad* 6) Compatible smart keyboard* 7) Compatible 1D barcode scanner* *Applicable to USB and RS232C interface model only. Connect to RS232C terminal.

REGULATORY COMPLIANCE	
Safety regulation	UL60950-1(2001) (USA) CSA22.2 No.60950-1-30 (Canada) EN60950-1, CE (Europe) CCC (GB4943-2001) (China)
EMC regulation	FCC15B Class B (USA/Canada) CE (EN55022, EN55024) (Europe) GB9254-1998, GB17625.1(2003) (China) KN22, KN24 (Korea)
Packing Drop Standard	ISTA-2A
Environmental (RoHS)	Chromium: below 0.1% Lead: below 0.1% Mercury: below 0.1% Cadmium: below 0.01% Polybrominated Biphenyl (PBB): below 0.1% Polybrominated Diphenyl Ether (PBDE): below 0.1%

2.2 OPTIONAL ACCESSORIES SPECIFICATIONS

CUTTER SPECIFICATIONS	
Media Type	Non-adhesive paper and Label
Media Size	**Pitch**: 22 to 300 mm (0.87” to 11.8”) **Pitch including liner**: 25 to 303 mm (0.98” to 11.93”) **Width**: 22 to 107 mm (0.87” to 4.21”) **Width including liner**: 25 to 110 mm (0.98” to 4.33”)
Thickness	0.06 to 0.19 mm (0.0024” to 0.0074”)
Self-diagnosis function	Cutter error detection
Durability	More than 300,000 cuts

DISPENSER SPECIFICATIONS	
Media Type	Label only * Some restrictions may apply to some label types depending on the substrate, adhesive, paper size, and environment. Refer to SATO representative on the labels to be used. * Perforated liner and split liner cannot be used. * Peel end labels
Media Size	**Pitch**: 22 to 100 mm (0.86” to 3.93”) **Pitch including liner**: 25 to 103 mm (0.98” to 4.05”) **Width**: 22 to 107 mm (0.86” to 4.21”) **Width including liner**: 25 to 110 mm (0.98” to 4.33”)
Thickness	0.06 to 0.19 mm (0.0024” to 0.0074”)
Sensor Type	Dispenser sensor (Reflective type)

LINERLESS (NONSEPA) KIT SPECIFICATIONS	
Media Type	Micro-perforated Linerless (Nonesepa) Label
Media Size	**Pitch**: 25 to 100 mm (0.98” to 3.93”) **With**: 25 to 110 mm (0.98” to 4.33”)
Thickness	0.06 to 0.19 mm (0.0024” to 0.0074”)
Media Winding direction	Face-out
Roll and core Diameter	Maximum outer diameter: 128 mm (5.04”) with Inner core diameter: 40 mm (1.5”)
Sensor Type	Label sensor (Reflective type)
Label issuing mode	Continuous mode, Tear-off mode

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3

INTERFACE SPECIFICATIONS

This section presents the interface types and their specifications for the CG4 Series printers. These specifications include detailed information to assist in the selection of the most appropriate method for the printer to interface with the host.

The following information is presented in this section:

- 3.1 Interface types
- 3.2 RS232C Serial Interface
- 3.3 IEEE 1284 Parallel Interface
- 3.4 Universal Serial Bus (USB) Interface
- 3.5 Local Area Network (LAN) Ethernet

3.1 INTERFACE TYPES

The CG4 Series has three types of Main PCBs. Each type of PCB is equipped with two different interface types for performing data communication with the host. These are described as follows.

1) **Type 1**: USB and LAN on-board
2) **Type 2**: USB and RS232C on-board
2) **Type 3**: USB and IEEE1284 on-board

Model	Interface Types			
	USB	LAN	RS232C	IEEE1284
CG4 series (Type 1)	Yes	Yes	-	-
CG4 series (Type 2)	Yes	-	Yes	-
CG4 series (Type 3)	Yes	-	-	Yes

CAUTION:
Never connect or disconnect interface cables (or use a switch box) with power applied to either the host or printer. This may caused damage to the interface circuitry in the printer/ host and is not covered by warranty.

3.2 RS232C SERIAL INTERFACE

3.2.1 Basic Specifications of RS-232C Serial Interface

This interface complies with the RS-232C standard.

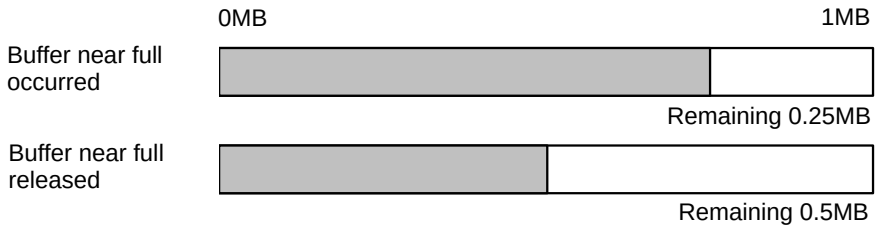
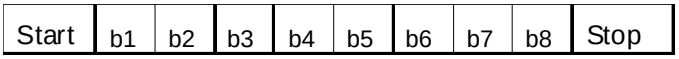
<table>
<tr><td>Interface connector</td><td>

DB-9S or equivalent (Male)
Cable length: 5m or less</td></tr>
<tr><td>Communication settings</td><td>Use Printer configuration tool or <I2> command to setup.
<I2>abcde
<table>
<tr><th>Parameter</th><th>Item</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="3">a</td><td rowspan="3">Baud rate</td><td>2</td><td>38400bps</td></tr>
<tr><td>1</td><td>19200bps [Default]</td></tr>
<tr><td>0</td><td>9600bps</td></tr>
<tr><td rowspan="2">b</td><td rowspan="2">Data bit length</td><td>1</td><td>7 bits</td></tr>
<tr><td>0</td><td>8 bits [Default]</td></tr>
<tr><td rowspan="3">c</td><td rowspan="3">Parity bits</td><td>2</td><td>EVEN</td></tr>
<tr><td>1</td><td>ODD</td></tr>
<tr><td>0</td><td>NONE [Default]</td></tr>
<tr><td rowspan="2">d</td><td rowspan="2">Stop bits</td><td>1</td><td>2 bits</td></tr>
<tr><td>0</td><td>1 bit [Default]</td></tr>
<tr><td rowspan="5">e</td><td rowspan="5">Protocol</td><td>4</td><td>STATUS 3</td></tr>
<tr><td>3</td><td>Protocol for driver (STATUS 4) [Default]</td></tr>
<tr><td>2</td><td>XON/XOFF</td></tr>
<tr><td>1</td><td>READY/BUSY (Multi item buffer)</td></tr>
<tr><td>0</td><td>READY/BUSY (Single item buffer)</td></tr>
</table></td></tr>
</table>

3.2 RS232C SERIAL INTERFACE (cont'd)

Function descriptions

Function	Description
Baud rate setting	Select the data rate (bps) for the RS232 port.
Data bit length	Sets the printer to receive either 7 or 8 bits of data for each byte transmitted.
Parity setting	Selects the type of parity used for error detection.
Stop bit setting	Selects the number of stop bits to end each byte transmission.
Protocol setting	Selects the flow control and status reporting protocols

<table>
<tr><td>Synchro system</td><td>Asynchronous method</td></tr>
<tr><td>Maximum receive buffer capacity</td><td>1MB
 
</td></tr>
<tr><td>Code</td><td>ASCII (7 bits), Graphic (8 bits)</td></tr>
<tr><td>Transmission form</td><td> 

[Note] If using 7 bits, b8 will be omitted.</td></tr>
<tr><td>Signal level</td><td>High level : +5 to +12V
Low level : -5 to -12V</td></tr>
<tr><td>Interface type</td><td>Use Printer configuration tool or <DI> command.
<DI>a
<table>
<tr><th>Parameter</th><th>Item</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="4">a</td><td rowspan="4">Interface selection</td><td>0</td><td>USB</td></tr>
<tr><td>1</td><td>RS-232C</td></tr>
<tr><td>2</td><td>Keypad</td></tr>
<tr><td>3</td><td>Scanner/ Smart keyboard</td></tr>
</table></td></tr>
</table>

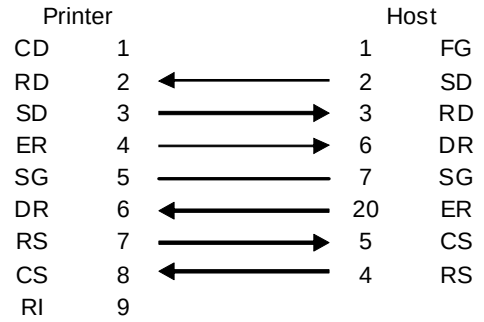
3.2 RS232C HIGH SPEED SERIAL INTERFACE (cont'd)

3.2.2 Ready/Busy

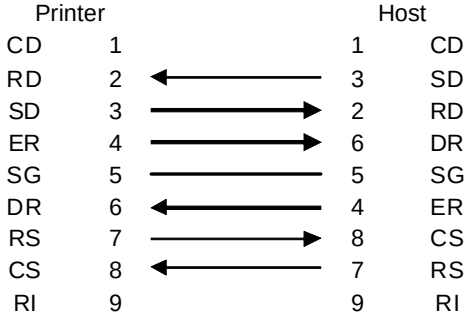
This protocol controls the reception of print data only by the control of hardware signal. Use the command <I2> to toggle between single item buffer and multi item buffer.
When the print data (STX ESC+"A"~ ESC+"Z" ETX) is sent from the host in the conditions below, received data may be incorrect.
1) When the printer is Offline
2) When an error has occurred in the printer

Pin Assignments

1) Host with DB-25P terminal



2) Host with DB-9P terminal



Interface Signals

Pin no.	Signal Type	Direction	Description
2	RD	Input	Data transferred from the host to the printer
3	SD	Output	Data transferred from the printer to the host
4	ER	Output	Data terminal READY
5	SG	-	Signal ground
6	DR	Input	Data set READY
7	RS	Output	Send request
8	CS	Input	READY to send

Notes:

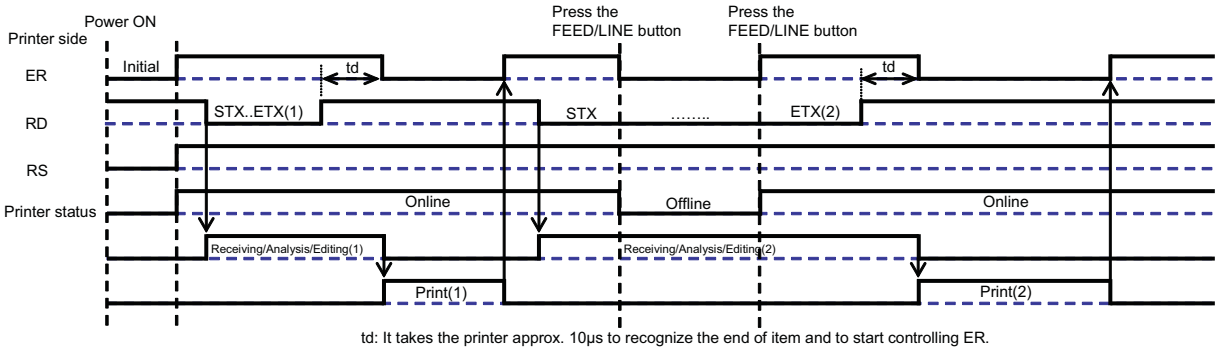
Follow the procedures below when executing READY/BUSY control.

1) When the host sends the data for printing labels, make sure that the printer is on.
2) Turning the printer on after the printer receives a request from the host to print labels may cause the printer not to print the first print data (approximately 120 bytes).
   To avoid this problem, it is necessary to attach approximate 120 bytes of dummy data by application software that enables the host to send the data for printing labels.
   For example: When sending [STX+<A>+<V>20+<H>20+<P>2+<L>0202+<X20>, 1234+<Q>2+<Z>+ETX], transfer the appropriate 120 bytes of dummy data shown below.
   [00H+00H+ ~ +00H+00H+00H+00H] + [STX ~ ETX]

3.2 RS232C HIGH SPEED SERIAL INTERFACE (cont'd)

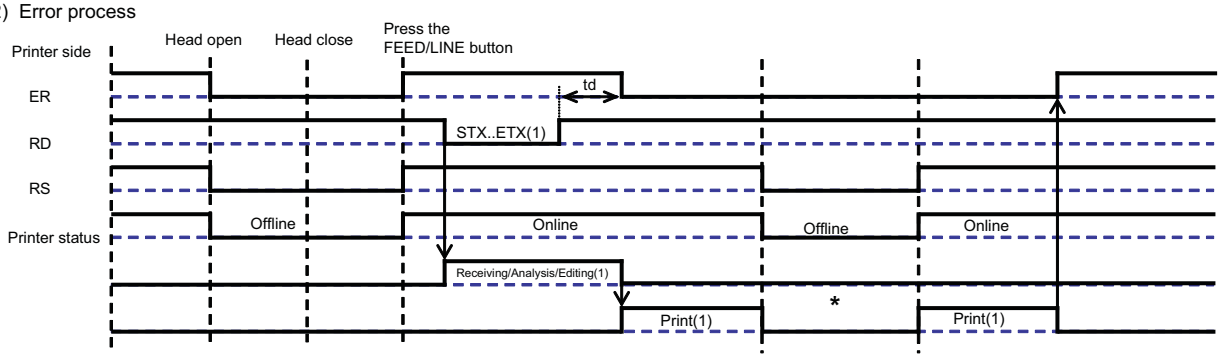
Timing Chart (Single item buffer)

(1) Normal process



td: It takes the printer approx. 10μs to recognize the end of item and to start controlling ER.

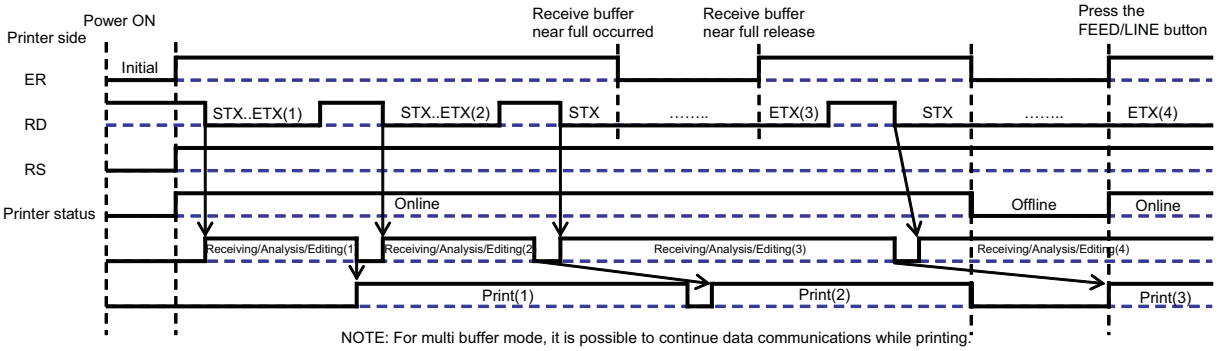
(2) Error process



* When the paper end has occurred: Open the head → Set the label → Close the head for feed operation.
NOTE: When the head is closed, the paper end will be released.

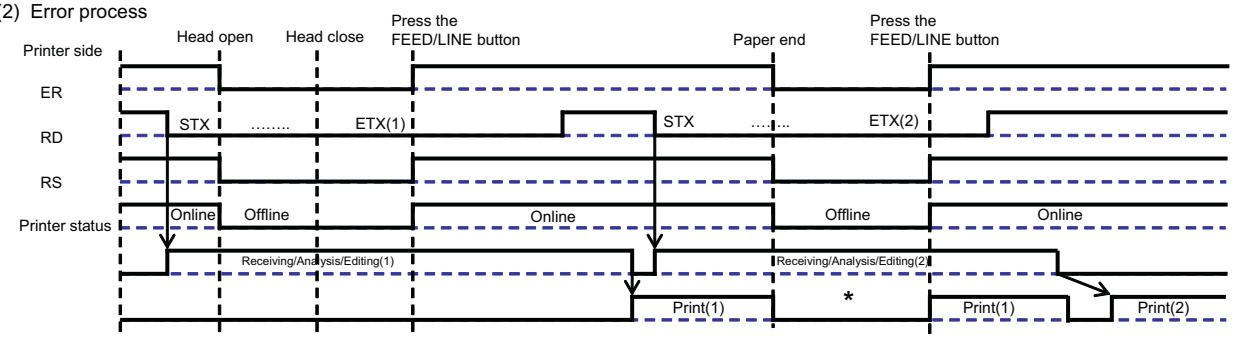
Timing Chart (Multi item buffer)

(1) Normal process



NOTE: For multi buffer mode, it is possible to continue data communications while printing.

(2) Error process



* When the paper end has occurred: Open the head → Set the label → Close the head for feed operation.
NOTE: When the head is closed, the paper end will be released.

3.2 RS232C HIGH SPEED SERIAL INTERFACE (cont'd)

3.2.3 X-ON/X-OFF

This transmission protocol informs the host if the printer is ready to receive data, by sending the "XON" (Hex 11H) or "XOFF" (Hex 13H) code.
When the print data (STX ESC+"A"~ ESC+"Z" ETX) is sent from the host in the conditions below, received data may be incorrect.
1) When the printer is Offline
2) When an error has occurred in the printer

Pin Assignments

1) Host with DB-25P terminal

Printer			Host	
RD	2	←	2	SD
SD	3	→	3	RD
SG	5	—	7	SG

2) Host with DB-9P terminal

Printer			Host	
RD	2	←	3	SD
SD	3	→	2	RD
SG	5	—	5	SG

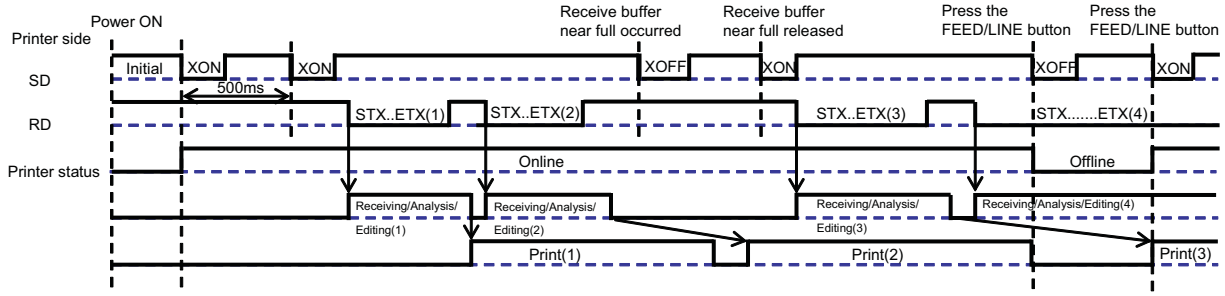
Note:
Depending on the host used, it may need to loop CS and RS (maintaining at "High" level) on the host side. Therefore, make sure to re-check the host before use.

Input/Output Signals

Pin no.	Signal Type	Direction	Description
2	RD	Input	Data transferred from the host to the printer
3	SD	Output	Data transferred from the printer to the host
5	SG	-	Signal ground

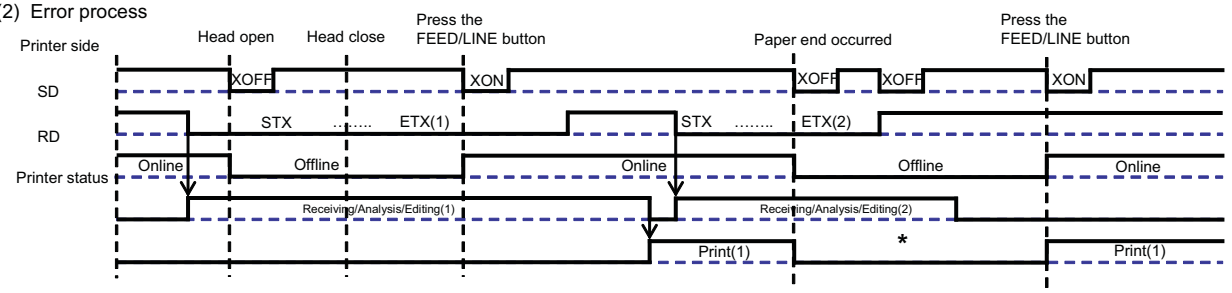
Timing Chart (Multi item buffer)

(1) Normal process



NOTE: In this protocol, executing the polling of "XON" at intervals of 500ms from the power supply to the first data reception.

(2) Error process



* When the paper end has occurred, Open the head → Reset the label → Close the head for feed operation.
NOTE: When the head is closed, the paper end will be released.
Data reception during the error ocurrence executes the transmission of "XOFF"

3.2 RS232C HIGH SPEED SERIAL INTERFACE (cont'd)

3.2.4 Return Status (STATUS 3 and Protocol for Driver (STATUS 4))

The purpose of these protocols is to control printer status on the host side. With the request command from the host, the status is returned from the printer.
After receiving the request command, the status is returned immediately.
In these communication protocols, receive mode is set to multi item buffer.

When the print data (STX ESC+"A"~ ESC+"Z" ETX) is sent from the host in the conditions below, received data may be incorrect.
1) When the printer is Offline
2) When an error has occurred in the printer

3.3 IEEE 1284 PARALLEL INTERFACE

3.3.1 Basic Specifications of IEEE1284 parallel interface

This interface complies with the Centronics/ IEEE1284 standard.
ECP mode is recommended for LPT1 port.
LPT1 port details can be set through a computer's BIOS settings.

<table>
<tr><td>Interface connector</td><td>
Printer side: Amphenol (DDK) 57 to 40360 or equivalent
Cable side: Amphenol (DDK) 57 to 30360 or equivalent
Cable length: 1.5m or less</td></tr>
<tr><td>Signal level</td><td>High level : +2.4 to +5.0V
Low level : +0.0 to +0.4V</td></tr>
<tr><td>Communication condition setting</td><td>Use the <I1> command for the following settings.
<table><tr><th>Item</th><th>Color</th></tr><tr><td>Receive mode</td><td>Single item buffer
Multi item buffer</td></tr><tr><td>ACK width</td><td>010 to 200 (1=50ns)</td></tr></table>Communication protocol cannot be fixed at compatible mode because of IEEE1284 negotiation.</td></tr>
<tr><td>Interface type</td><td>Use Printer configuration tool or <DI> command.
<DI>a
<table><tr><th>Parameter</th><th>Item</th><th>Value</th><th>Decription</th></tr><tr><td rowspan="2">a</td><td rowspan="2">Interface</td><td>0</td><td>USB</td></tr><tr><td>1</td><td>IEEE1284</td></tr></table></td></tr>
<tr><td>Maximum receive buffer capacity</td><td>1MB
</td></tr>
<tr><td>DeviceID</td><td>CG408
“MFG:SATO;CMD:PCL,MPL;MDL:CG408;”
CG412
“MFG:SATO;CMD:PCL,MPL;MDL:CG412;”</td></tr>
</table>

3.3 IEEE 1284 PARALLEL INTERFACE (cont'd)

3.3.2 Pin Assignments

Pin assignment of each signal for the Centronics standard (Compatible Mode) is as follows.
Note that the connection of the IEEE1284standard complies with the IEEE1284-B standard.

PIN No.	Signal	I/O	PIN No.	Signal	I/O
1	$\overline{\text{STROBE}}$	Input	19	STROBE-RETURN	
2	DATA 1	Input	20	DATA 1-RETURN	
3	DATA 2	Input	21	DATA 2-RETURN	
4	DATA 3	Input	22	DATA 3-RETURN	
5	DATA 4	Input	23	DATA 4-RETURN	
6	DATA 5	Input	24	DATA 5-RETURN	
7	DATA 6	Input	25	DATA 6-RETURN	
8	DATA 7	Input	26	DATA 7-RETURN	
9	DATA 8	Input	27	DATA 8-RETURN	
10	$\overline{\text{ACK}}$	Output	28	ACK -RETURN	
11	BUSY	Output	29	BUSY -RETURN	
12	PE	Output	30	PE -RETURN	
13	SELECT	Output	31	$\overline{\text{INIT}}$	Input
14	$\overline{\text{AUTOFD}}$	Input	32	$\overline{\text{FAULT}}$	Output
15			33		
16	LOGIC GND		34		
17	CHASSIS GND		35		
18	PERIPHERAL LOGIC HIGH	Output	36	$\overline{\text{SELECTIN}}$	Input

3.3 IEEE 1284 PARALLEL INTERFACE (cont'd)

3.3.3 Input/Output Signals

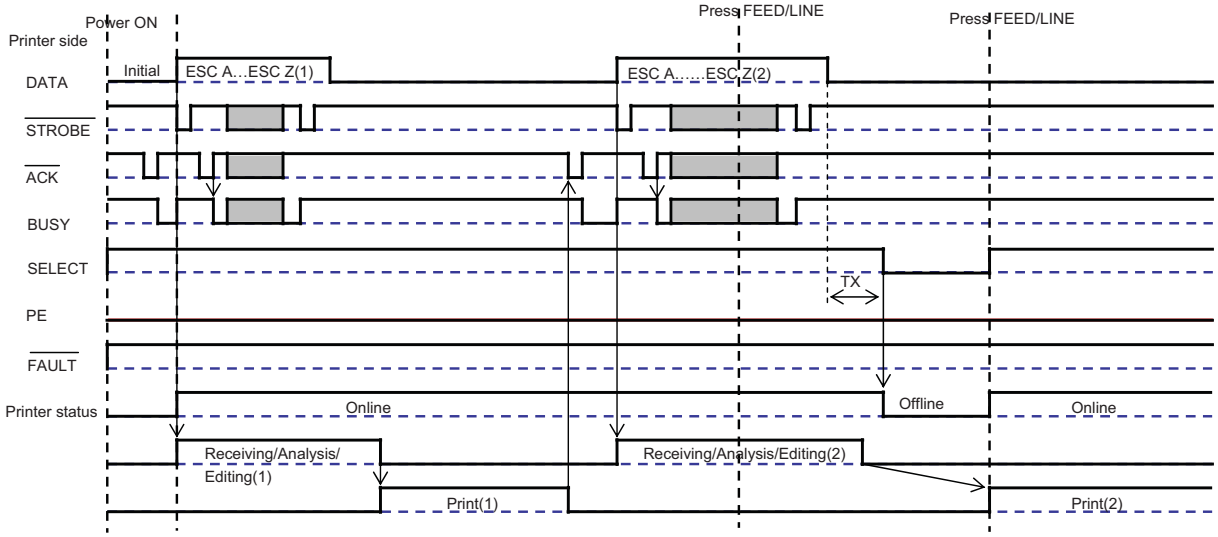
The details of each signal line for the Centronics standard (Compatible Mode) are as follows.
Note that each signal line complies with the IEEE1284 standard.

Signal	I/O	Description
STROBE	Input	Synchronization signal that requires low active pulse to read DATA1 ~ DATA8
DATA 1 ~ DATA 8	Input	Data entry of 8bits parallel: DATA1 --LSB (lowest bit) DATA8 --MSB (highest bit)
$\overline{\text{ACK}}$	Output	Low active pulse signal indicating the completion of receive data import
BUSY	Output	High active signal indicating that the printer is not ready to receive data
PE	Output	High active signal indicating paper shortage
SELECT	Output	High active signal indicating that the printer is ready to receive data
$\overline{\text{AUTOFD}}$	Input	Signal for the IEEE1284 standard
CHASSIS GND		Connecting to framework ground
PERIPHERAL LOGIC HIGH	Output	+5V voltage on the printer side
SIGNAL GND		Connecting to each signal ground
$\overline{\text{INIT}}$	Input	Low active pulse signal requesting to reset the printer
$\overline{\text{FAULT}}$	Output	Low active pulse signal indicating an error in the printer
$\overline{\text{SELECTIN}}$	Input	Signal for the IEEE1284 standard

3.3 IEEE 1284 PARALLEL INTERFACE (cont'd)

Timing Chart (Single item buffer)

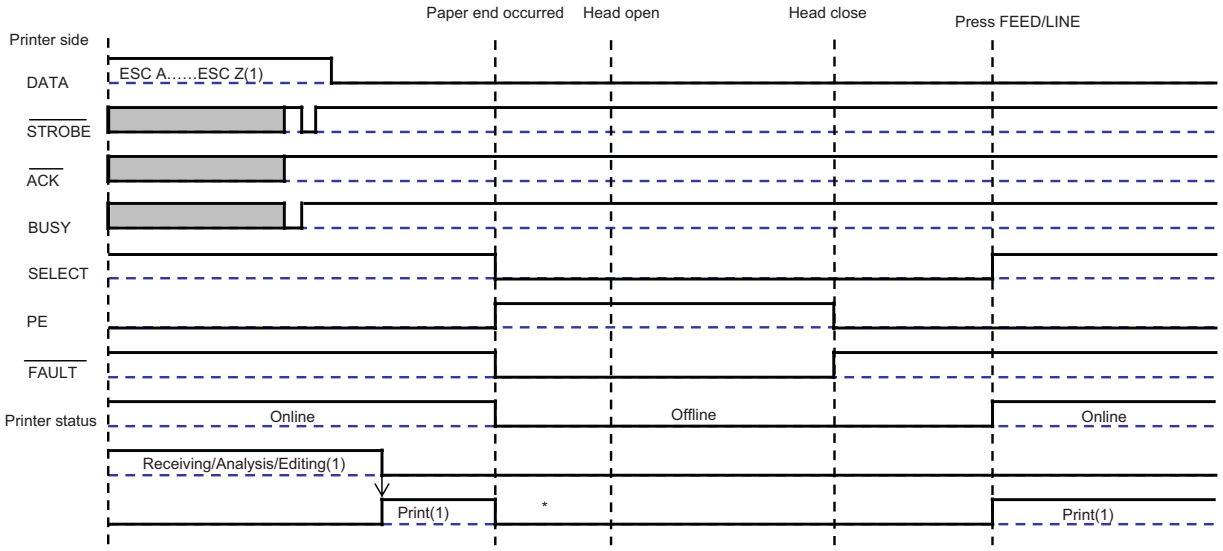
1) Normal process



*TX<5ms>

[Important]
Turning the printer off when sending a continuous job will result in the lack of subsequent job.
(16 bytes after the command [ESC+Z] is maintained in the printer, but the next job of 16 bytes will be cleared by turning the printer off.)

2) Process of paper end occurrence

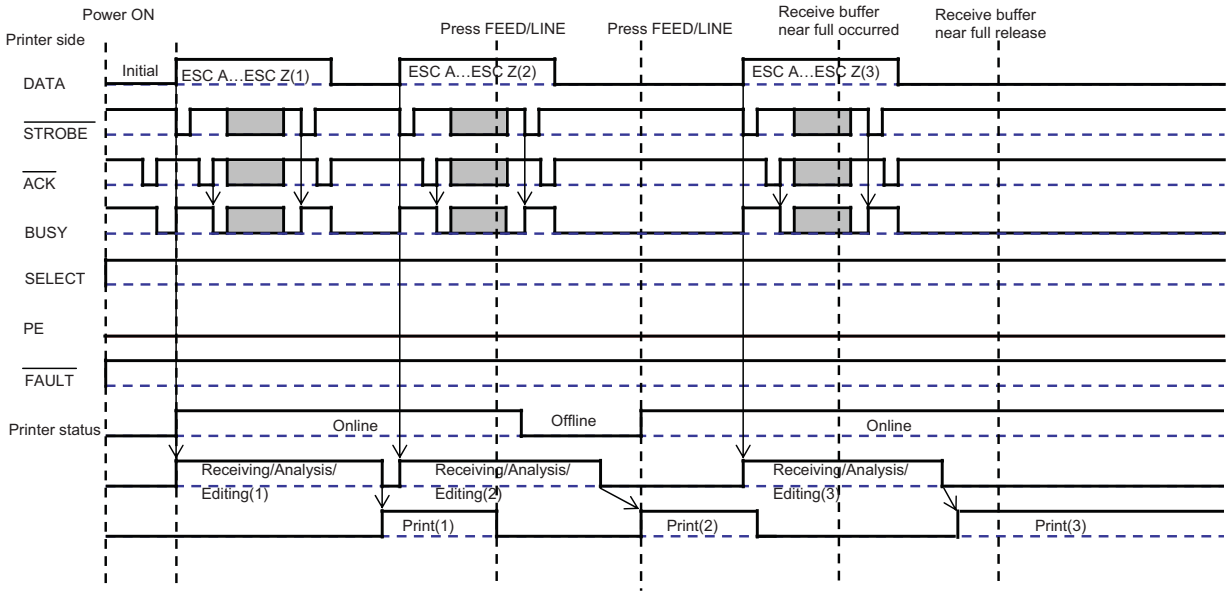


NOTE: (1) When the paper end has occurred, Open the print head assembly → Reset the label → Close the print head assembly for feed operation.
(2) When the print head assembly is closed, the paper end will be released.

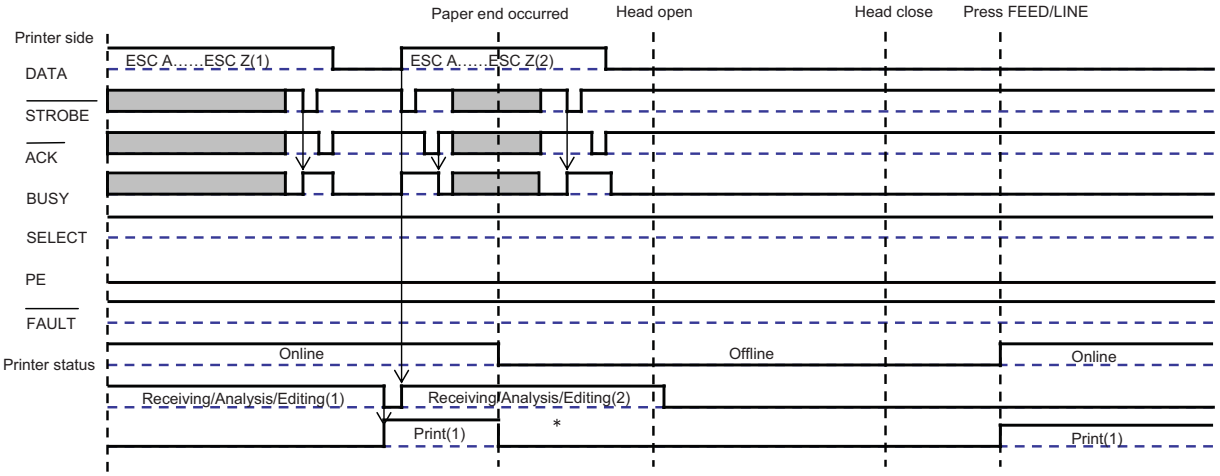
3.3 IEEE 1284 PARALLEL INTERFACE (cont'd)

Timing Chart (Multi item buffer)

1) Normal process



2) Process of paper end occurrence



NOTE: (1) When the paper end has occurred, Open the print head assembly → Reset the label → Close the print head assembly for feed operation.
(2) When the print head assembly is closed, the paper end will be released.

3.4 UNIVERSAL SERIAL BUS (USB) INTERFACE

This printer supports the USB 2.0-compliant interface and the transfer rate at 12.5 Mbits/second.

3.4.1 Basic Specifications of USB interface

The USB interface is available with all three types of boards.

<table>
<tr><td>Interface connector</td><td>

Series B plug
Cable length: 5m or less (Twisted Pair Shielded)</td></tr>
<tr><td>Version</td><td>USB 2.0</td></tr>
<tr><td>Maximum receive buffer capacity</td><td>1MB
0MB 1MB
Buffer near full occurred
Remaining 0.25MB
Buffer near full released
Remaining 0.5MB</td></tr>
<tr><td>Interface type</td><td>Use Printer configuration tool or <DI> command.
<DI>a
<table>
<tr><th>Parameter</th><th>Item</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="4">a</td><td rowspan="4">Interface</td><td>0</td><td>USB</td></tr>
<tr><td>1</td><td>RS-232C/LAN/IEEE1284</td></tr>
<tr><td>2</td><td>Keypad</td></tr>
<tr><td>3</td><td>Scanner/ Smart keyboard</td></tr>
</table></td></tr>
</table>

3.4.2 Pin Assignments

Pin No.	Description
1	VBus
2	-Data(D-)
3	+Data(D+)
4	GND

3.4 UNIVERSAL SERIAL BUS (USB) INTERFACE (cont'd)

3.4.3 Host Computer Settings

Installation of USB Standard Print Support

It is necessary to install the USB driver in addition to the printer driver to perform print operation via the USB port.

As for the USB driver installation procedure, refer to [How to Install the USB Standard Print Support] in the printer driver installation specifications.

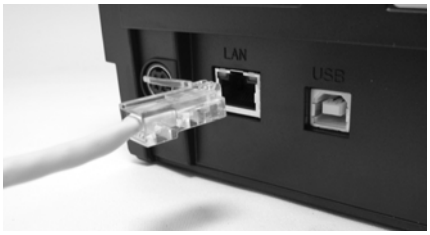
Notes

- OS environment corresponding to the USB interface is [Windows2000/XP/Server2003/Vista], however, the connection may not be established depending on the manufacturers or models. For more details, refer to your host computer documentation.
- USB cable length under 1m is recommended.
- Device name of USB port should be "Serial number".
  For example: CRGY0032

3.5 LOCAL AREA NETWORK (LAN) ETHERNET

3.5.1 Basic Specifications of LAN

A Local Area Network (LAN) interface requires a driver shipped with each printer that has the interface installed. The driver must be loaded on the host computer and configured to run one of the supported network protocols using a 10/100BaseT LAN connection.

<table>
<tr><td>Interface connector</td><td> 

Cable type: For 10BASE-T and 100BASE-TX
Cable length: 100m or less</td></tr>
<tr><td>Link/Status LED</td><td>Status LED lights up when establishing the LINK with Ethernet equipment. The LINK is established by Auto Negotiation.
<table>
<tr><th>LED</th><th>Color</th><th>Conditions</th></tr>
<tr><td>LINK</td><td>Green</td><td>Lights up when establishing the LINK</td></tr>
<tr><td>SPEED</td><td>Orange</td><td>Lights off when recognizing the destination 10BASE-T
Lights up when recognizing the destination 100BASE-TX</td></tr>
<tr><td>COLLISION</td><td>Red</td><td>Lights up when collision occurs</td></tr>
</table></td></tr>
<tr><td>Maintenance function</td><td>[Printing LAN configuration information]
LAN configuration information will be printed on the third sheet of user test print and factory test print.
[Initializing LAN configuration information]
LAN configuration information will be initialized through [All Clear] of Factory Clear Mode. For more details, refer Section 4.12 Factory Clear Mode.</td></tr>
<tr><td>Interface type</td><td>Use Printer configuration tool or <DI> command.
<DI>a
<table>
<tr><th>Parameter</th><th>Item</th><th>Value</th><th>Decription</th></tr>
<tr><td rowspan="2">a</td><td rowspan="2">Interface</td><td>0</td><td>USB</td></tr>
<tr><td>1</td><td>LAN</td></tr>
</table></td></tr>
</table>

3.5 LOCAL AREA NETWORK (LAN) ETHERNET (cont'd)

Communication configuration

The following settings can be configured via the Printer configuration tool or commands.

Item	Command	Setting range
LAN mode	<I3>	Protocol for driver (STATUS4) cyclic response mode *1 Protocol for driver (STATUS4) ENQ response mode *1 STATUS3 *2
	[Coding example] To set the protocol for driver (STATUS4) cyclic response mode, send the following command to printer: <A> <I3>0 <Z>	
IP address	<W1>	0.0.0.0 ~ 255.255.255.255
Subnet mask	<W2>	0.0.0.0 ~ 255.255.255.255
Gateway address	<W3>	0.0.0.0 ~ 255.255.255.255
IP address setup	<WI>	Manual DHCP
RARP	<WM>	RARP disabled RARP enabled

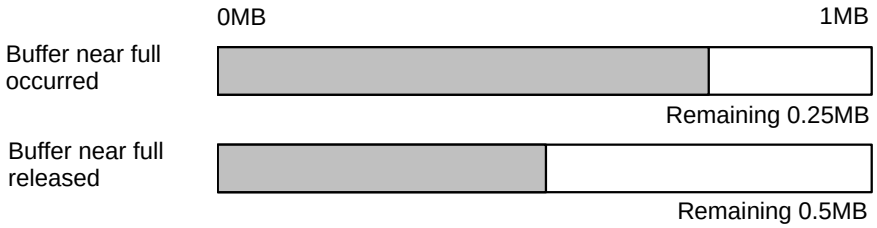
*1 2-port connection by Port1024 and Port1025 or 1 port connection by Port9100.

*2 1 port connection by Port1024 or Port9100.

Note:
Please refer to the Command specification for more details in Sending commands.

Maximum receive buffer capacity

1MB



3.5.2 Software Specifications

Protocol	TCP/IP
Network layer	ARP, RARP, IP, ICMP
Session layer	TCP, UDP
Application layer	LPR, FTP, TELNET, BOOTP, DHCP, HTTP

Notes

- Send the print data by LPR and FTP of TCP/IP and dedicated socket protocol. (STATUS3, Protocol for driver (STATUS4))
- Use socket connection to get the printer status.

3.5 LOCAL AREA NETWORK (LAN) ETHERNET (cont'd)

3.5.3 TCP/IP Specifications

In TCP/IP protocol environment, LPD and FTP are provided for printing. TELNET is provided for the setup of various variables, and ARP, RARP and BOOTP/DHCP for the setup of IP address are available.

In socket connection, the printing operation and the status are monitored. In this case, multiple connections cannot be established at the same time.

WindowsNT and Windows2000/XP/Server2003/Vista operating system support LPD of TCP/IP that enables you to print; however, Windows98/Me is not configured with LPD. In order to perform printing operation, off-the-shelf printing software is required.

3.5.4 LPD Specifications

LPD protocol complies with RFC1179 and handles the list of logical printer name as queue name such as lp, sjis and euc.

Queue name	Kanji filter applied	Input Kanji code
lp	Not available	N/A
sjis	Available	Shift JIS
euc	Available	EUC

When sending a job by LPR, the transmission order of data file/control file within the job does not affect the printing operation.

Notes

- A job deletion by LPR is not supported.
- LPD is available only for Protocol for Driver (STATUS4).
- If executing a large quantity of printing by LPD, some parts of the data may be missing due to the Windows specification.

3.5.5 FTP Specifications

FTP protocol complies with RFC959 and handles the list of logical printer name as transfer directory. File transfer to this directory executes printing operation. Note that it is possible to specify ASCII(A), BINARY(I), and TENEX(L8) as transfer modes although mode difference is dependent on the client side.
There are three directory names such as lp, sjis and euc.

Queue name	Kanji filter applied	Input Kanji code
lp	Not available	N/A
sjis	Available	Shift JIS
euc	Available	EUC

3.5 LOCAL AREA NETWORK (LAN) ETHERNET (cont'd)

3.5.6 TELNET Specifications

TELNET complies with RFC854. This consists of an interactive menu form, and it enables you to change and refer internal setup and to display status. To change the setting details, enter 'root' user name and password at the time of login. Default ROOT password is set to null (line feed only).

<TELNET command example>

In MS-DOS command prompt, type in [TELNET xxx.xxx.xxx.xxx (IP address)] and enter user name and password to advance to the display below.

```
SATO PRINTER ModelName TELNET server.
Copyright 2006(C) SATO Corporation.

login: root
'root' user needs password to login
password:
User 'root' logged in

 No.   Item                          Value                (level.1)
-------------------------------------------------------------------------------
   1 : Setup TCP/IP
   2 : Display status
  99 : Exit setup
Please select(1-99)?
```

Each printer model name will appear in [Model Name].
For the detailed settings of [1:Setup TCP/IP], refer to **Section 3.5.7 Setting/Displayed Items**.

3.5.7 Setting/Displayed Items

The following table shows the settings and referable sections as well as various variables.

TCP/IP related settings

Variable identifier	Default (Factory setting)	Setting range
IP address	0.0.0.0 (Externally obtained)	0.0.0.0 ~ 255.255.255.255
Subnet mask	0.0.0.0 (Derived from IP address)	0.0.0.0 ~ 255.255.255.255
Gateway address	0.0.0.0 (Invalid)	0.0.0.0 ~ 255.255.255.255
RARP protocol	ENABLE	ENABLE/DISABLE
DHCP protocol	ENABLE	ENABLE/DISABLE
Keep alive time	180(sec)	30 ~ 300
Socket cancel	Normal	Normal / compatible
ROOT password	NULL (No password)	Up to 16 random alphanumeric characters

3.5 LOCAL AREA NETWORK (LAN) ETHERNET (cont'd)

Notes

1) For the detailed On-board LAN interface settings, refer to the included [Setup Guide] and the Network Utility of [SATO Accessory CD-ROM].
2) To open/close Print data port (Port1024), Status port (Port1025) or Sending/Receiving port (Port9100), make sure to close and open the port at intervals of approximately 150ms to 200ms. If you don't have enough time from closing to opening the port, it may result in double connection.
   If the host requests the connection to the port already connected (Port1024, Port1025 or Port9100), the printer accepts the request (establishing double connection); however, the printer disconnects the second connection immediately.
3) Do not connect and disconnect the LAN cable while starting up the printer. Restart the printer with which you are having a communication error due to connection/disconnection of the LAN cable.

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4

OPERATION AND CONFIGURATION

Before using the printer, it is best to read this manual thoroughly. Otherwise, you may disturb default settings on which the instructional procedures in this manual are based.

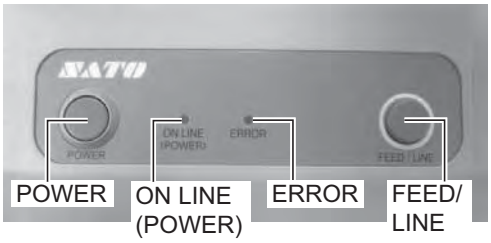
Most of the printer's settings are controlled via standard SBPL commands or by using the provided SATO Utilities Tool application.

Some printer settings may be manually configured via the **POWER** and **FEED/LINE** buttons with the **ON LINE (POWER)** indicator and **ERROR** indicator on the front of printer. All of the printer's buttons are used either singularly, or together, to perform configuration activities. The instructions to these operations are described in this section.

4.1 OPERATOR PANEL

The operator panel located on the top front, consists of two buttons and two LED indicators (red and green).

- **POWER** button
  Press **POWER** button to turn on or off the printer.
  Press **POWER** button together with **FEED/LINE** button to enter various operating modes.



- **FEED/LINE** button
  - Press **FEED/LINE** button during normal print operation to pause the printing and set the printer to offline mode. Press again to toggle the printer between the online and offline mode.
  - When printer idles in online mode, press the **FEED/ LINE** button to feed a blank label.
  - During label feed, press the **FEED/LINE** button to pause label feed and go offline.
  - The printer will go offline after opening and closing the top cover. Press the **FEED/LINE** button to make the printer go online.

- **ON LINE (POWER)** and **ERROR** indicators
  When the printer is in normal mode, this two indicators notifies the user of various status conditions:

LED Indicator	Color	Functions
ON LINE (POWER)	Green	Illuminates when printer is ready to receive data or is in printing mode (Online). Blinks when the printer is in offline mode.
ERROR	Red	Illuminates or blinks when there is a system fault, for example, paper end.

During different operation modes, the **ON LINE (POWER)** and **ERROR** indicators turn on and flash differently.
In this section, the combination of the following symbols has been used to describe the indicator lighting sequence. Refer to the example listed below for lighting sequences.

Indicator symbol	Status
○	Off
●	Red light
◎	Green light

The repeating patterns are as shown in the below examples. The sequences are indicated as from left to right. One LED Indication flash is approximately 200ms, and two indication flashes in a row are for about 400ms.

Example 1	Indicator: Red light.	●→●→●→●
Example 2	Indicator: Green light.	◎→◎→◎→◎
Example 3	Indicator: Blinking red light.	●→○→●→○
Example 4	Indicator: Blinking green light.	◎→○→◎→○
Example 5	Indicator: off	○→○→○→○

4.2 OPERATING MODES

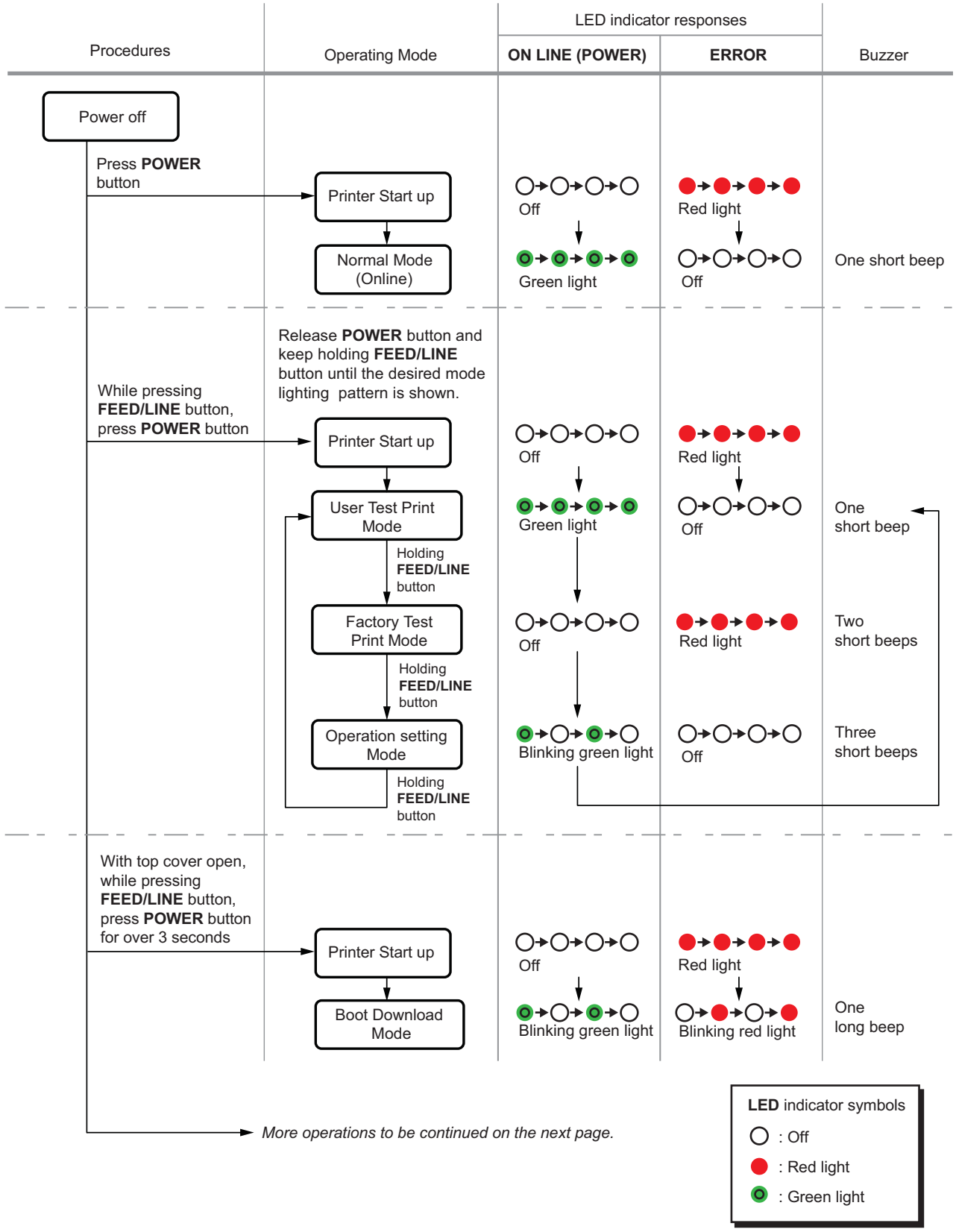
You can set the printer in any of the following modes:

1. Normal mode (including Online/Offline modes)
2. User Test print mode
3. Factory Test print mode
4. Operation Setting mode:
   - Program download mode
   - Font download mode
   - Default setting mode
   - HEX Dump mode
   - USB interface
   - RS-232C/ LAN/ IEEE 1284 interface
   - Keypad selection
   - Scanner, Smart keyboard
5. Boot Download mode
6. Factory Clear mode
7. Factory Adjustment mode
8. Factory USB interface mode
9. Factory USB Boot Download mode

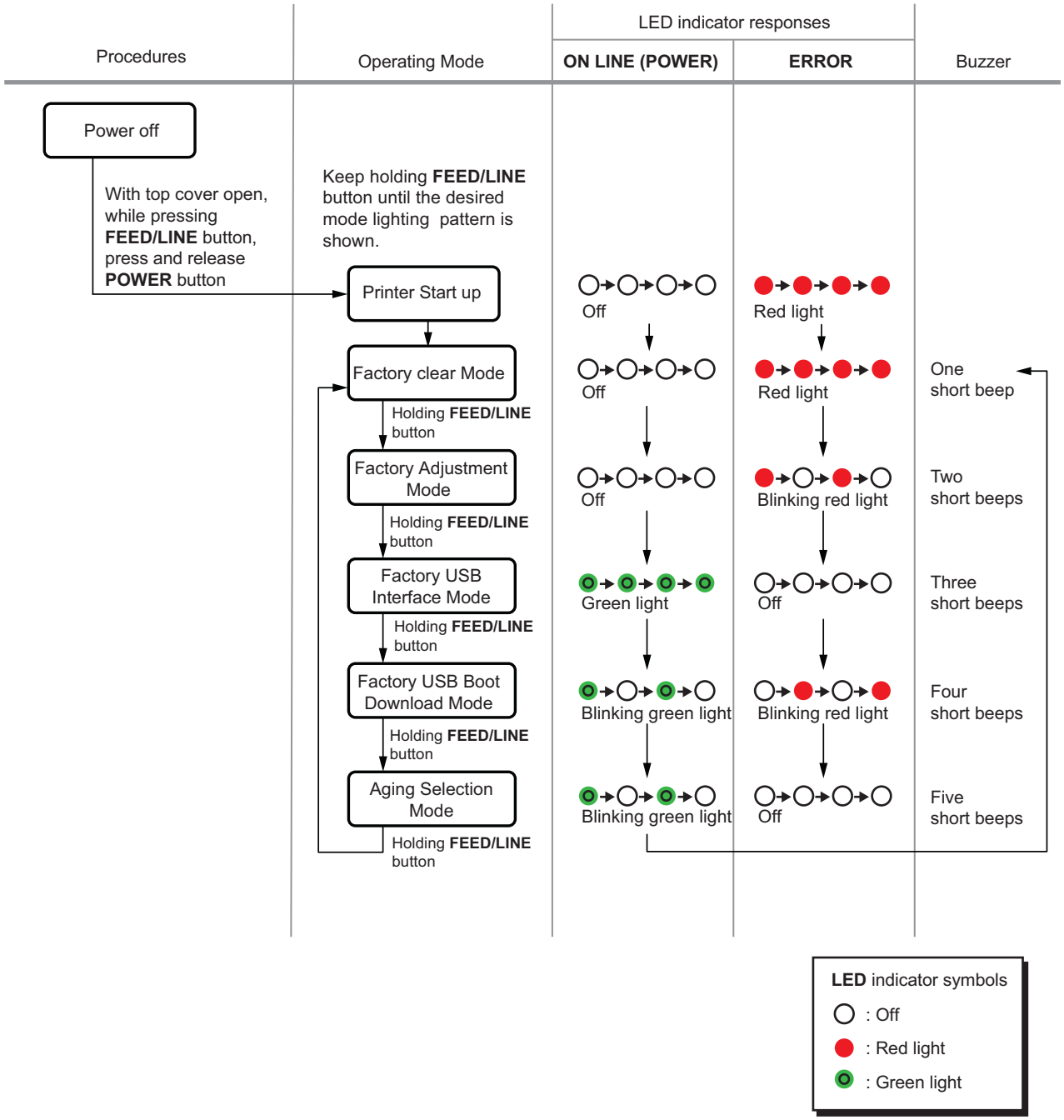
You can access the modes by pressing and releasing the **POWER** button and the **FEED/LINE** button at particular points during the **ON LINE (POWER)** and **ERROR** indicators' lighting sequence.

4.2 OPERATING MODES (cont'd)

The following flow chart provides a clear summary of each of the modes and its access method.



4.2 OPERATING MODES (cont'd)



4.3 USER TEST PRINT MODE

This mode produces test labels for diagnostic purposes.

Preparation:
Make sure the media or ribbon (if required) are properly loaded in the printer.

Procedures	Printer status	ON LINE (POWER) indicator	ERROR indicator	Buzzer
1 While pressing **FEED/LINE** button, press and release **POWER** button. Keep holding **FEED/LINE** button.	Printer start-up	Off	Red light	
2 Release **FEED/LINE** button when **ON LINE (POWER)** indicator changes to green light and single short beep sound is heard. (The printer will cyclically advance to next mode as long as the **FEED/LINE** button is held down.)	User Test Print mode. **FEED/LINE** released User Test Print mode is activated and then paused.	Green light Blinking green light	Off Off	One short beep
3 Press **FEED/LINE** button to start test printing. Press **FEED/LINE** button to pause the test printing. Press again to resume.	User Test Print start and print continuously. User Test Print paused.	Green light Blinking green light	Off Off	

Notes:

- If you missed the chance to release the **FEED/LINE** button in step 2 above, just keep holding the **FEED/LINE** button and wait for the next cycle.
- If you released the **FEED/LINE** button at the wrong **ON LINE (POWER)** or **ERROR** indicators, just turn off the power and restart the procedure.
- The printer will continuously print the user test labels until the **FEED/LINE** button is pressed. The printing is paused and will resume printing if the **FEED/LINE** button is press again.

To terminate the User Test Print mode
First, ensure that you have pressed the **FEED/LINE** button to pause the test printing, then press **POWER** to turn off the printer.

4.3 USER TEST PRINT MODE (cont'd)

4.3.1 Output Data of the User Test Print

The output data of the User Test Print shows the current settings of the printer.
These output data are printed in three parts, each with the printing area of 110mm [4.33"] (Width) x 115mm [4.53"] (Pitch), Standard.

First print-out (Settings)

No.	Print Item		Contents of the print data
1	Model	Printer model name	CG408TT(*), CG412TT(*) CG408DT, CG412DT *: "T" is printed for thermal transfer print. "D" is printed for direct thermal print.
2	Offset	Offset value (Vertical and horizontal directions)	(H)±300 (V)±300 DOT
3	Pitch Offset	Pitch offset value	±099 DOT
4	Cut Offset	Cut position offset value	±099 DOT
5	Peel Offset	Peel off position offset value	±099 DOT
6	Tear Off Offset	Tear off position offset value	±099 DOT
7	Label Size	Label size (Pitch/Width)	(P)**** x (W)*** DOT
8	Print Speed	Print speed	50mm/s 75mm/s 100mm/s
9	Print Darkness	Print darkness	1A~5A
10	Operation mode	Operation mode	CUT/ NONE SEPA/ TEAR OFF/ DISPENSER/ CONTINUOUS
11	Sensor Type	Sensor type	Gap I-Mark None
12	Paper End Search	Paper end detection method	TAG/ ROLL
13	Zero Slash	Zero slash	ON/ OFF
14	Proportional Pitch	Proportional pitch	ON/ OFF
15	Buzzer	Buzzer	ON/OFF
16	Initial Feed	Initial feed	ON/ OFF
17	Protocol-codes	Protocol code setting value (Standard / Nonstandard)	Nonstandard/ Standard
18	Option waiting time	Option waiting time	500 to 20000 ms
19	Num of formats stored	Number of formats stored	*
20	Printer mode	Printer mode	ONLINE/ STANDALONE

4.3 USER TEST PRINT MODE (cont'd)

Second print-out (Protocol code setting values)

No.	Print Item	
1	STX	
2	ETX	
3	ESC	
4	ENQ	
5	CAN	
6	NULL	
7	OFFLINE	
8	AUTO ONLINE	
9	ZERO SLASH	Zero slash
10	EURO	Euro code

Third print-out (Interface)

USB and RS-232C interface on board

No.	Print Item		Contents of the print data
1	Selected Interface	In-use interface	USB / RS-232C / Keypad / Scanner
2	Interface 1	Interface 1	USB
3	Buffer Type	Buffer type	Multi
4	Protocol	Protocol	Driver
5	Serial No.	Serial No.	Serial No./ None
6	Interface 2	Interface 2	RS-232C
		Communication parameters	(19200.8.N.1) Baud rate (bps) 9600, 19200, 384000 Data length (bit) 8, 7 Parity N, O, E Stop bit (bit) 1 2
7	Buffer Type	Buffer type	1 item / Multi
8	Protocol	Protocol	ER/RS XON/XOF Driver Status3

4.3 USER TEST PRINT MODE (cont'd)

USB and IEEE 1284 interface on board

No.	Print Item		Contents of the print data
1	Selected Interface	In-use interface	USB / IEEE1284
2	Interface 1	Interface 1	USB
3	Buffer Type	Buffer type	Multi
4	Protocol	Protocol	Driver
5	Serial No.	Serial No.	Serial No./ None
6	Interface 2	Interface 2	IEEE1284
7	Buffer Type	Buffer type	Multi / 1 item
8	Protocol	Protocol	Driver

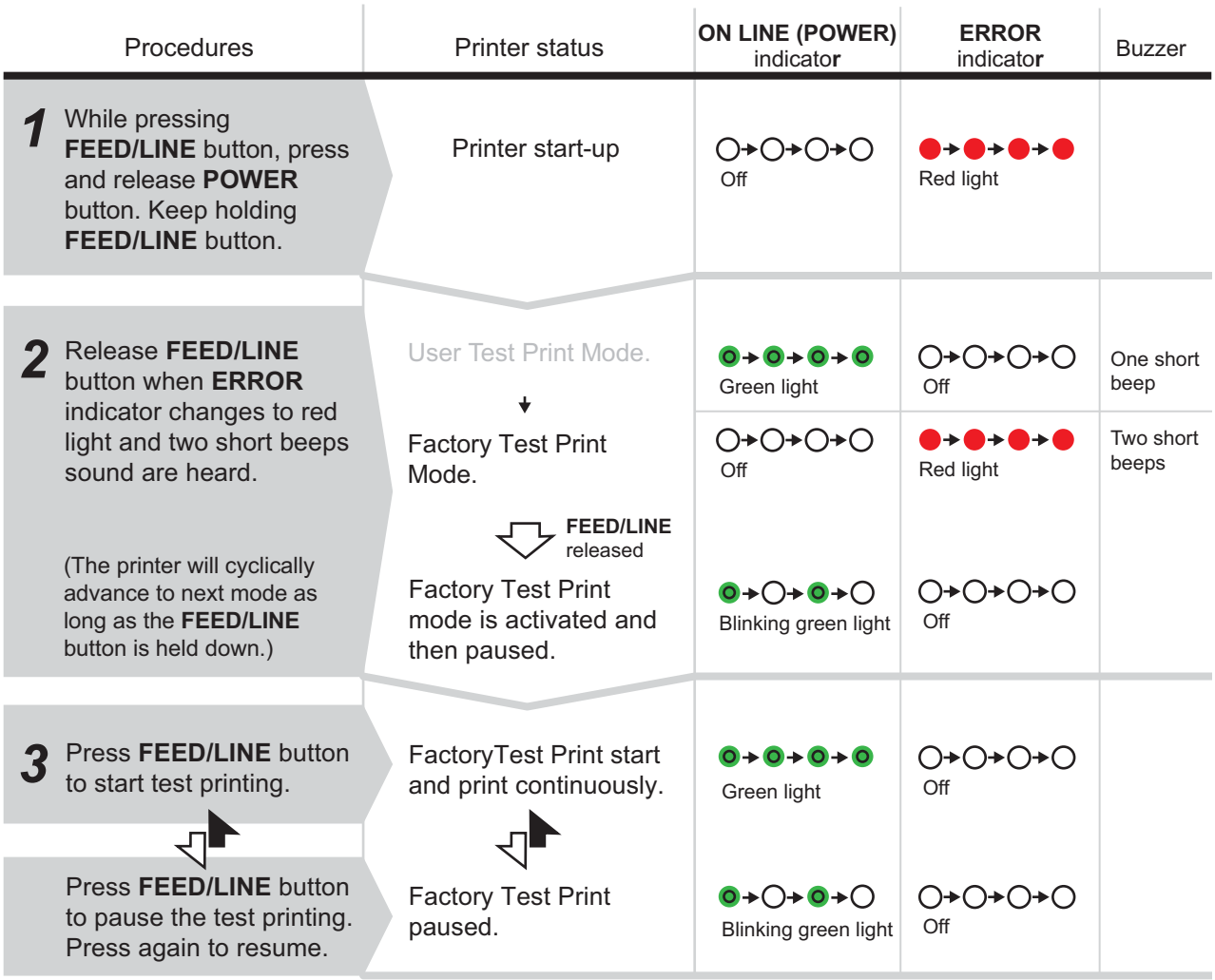
USB and LAN interface on board

No.	Print Item		Contents of the print data
1	Selected Interface	In-use interface	USB / LAN
2	Interface 1	Interface 1	USB
3	Buffer Type	Buffer type	Multi
4	Protocol	Protocol	Driver
5	Serial No.	Serial No.	Serial No./ None
6	Interface 2	Interface 2	LAN
7	Buffer Type	Buffer type	Multi
8	Protocol	Protocol	Driver(CYC) Driver(ENQ) Status3
9	MAC Address	MAC address	**:**:**:**:**:**
10	IP Address	IP address	000.000.000.000 ~ 255.255.255.255
11	Subnet Mask	Subnet mask	000.000.000.000 ~ 255.255.255.255
12	Default Gateway	Default gateway	000.000.000.000 ~ 255.255.255.255
13	DHCP	DHCP	Enable / Disable
14	RARP	RARP	Enable / Disable

4.4 FACTORY TEST PRINT MODE

This mode produces test labels for diagnostic purposes.

Preparation:
Make sure the media or ribbon (if required) are properly loaded in the printer.


Procedures
Printer status
ON LINE (POWER) indicator
ERROR indicator
Buzzer
1 While pressing FEED/LINE button, press and release POWER button. Keep holding FEED/LINE button.
Printer start-up
Off
Red light
2 Release FEED/LINE button when ERROR indicator changes to red light and two short beeps sound are heard.
(The printer will cyclically advance to next mode as long as the FEED/LINE button is held down.)
User Test Print Mode.
Green light
Off
One short beep
Factory Test Print Mode.
Off
Red light
Two short beeps
FEED/LINE released
Factory Test Print mode is activated and then paused.
Blinking green light
Off
3 Press FEED/LINE button to start test printing.
FactoryTest Print start and print continuously.
Green light
Off
Press FEED/LINE button to pause the test printing. Press again to resume.
Factory Test Print paused.
Blinking green light
Off

Notes:

- If you missed the chance to release the **FEED/LINE** button in step 2 above, just keep holding the **FEED/LINE** button and wait for the next cycle.
- If you released the **FEED/LINE** button at the wrong **ON LINE (POWER)** or **ERROR** indicators, just turn off the power and restart the procedure.
- The printer will continuously print the Factory test labels until the **FEED/LINE** button is pressed. The printing is paused and will resume printing if the **FEED/LINE** button is press again.

To terminate the Factory Test Print mode
First, ensure that you have pressed the **FEED/LINE** button to pause the test printing, then press **POWER** to turn off the printer.

4.4 FACTORY TEST PRINT MODE (cont'd)

4.4.1 Output Data of the Factory Test Print

The output data of the Factory Test Print shows the internal operating parameters of the printer.
These output data are printed in three parts, each with the printing area of 110mm [4.33"] (Width) x 115mm [4.53"] (Pitch), Standard.

First print-out (Settings)

No.	Print Item		Contents of the print data
1	Model	Printer model name	CG408TT(*), CG412TT(*) CG408DT, CG412DT *: "T" is printed for thermal transfer print. "D" is printed for direct thermal print.
2	Firm Ver	Printer F/W version	**.**.**.**
3	Firm Date	Printer F/W creation date	YY.MM.DD
4	Font Version	Font version	**.**
5	Serial No.	Serial No.	Serial No./ None
6	Life Counter	Life counter	*.* Km
7	Head Counter1	Head counter 1	*.* Km
8	Head Counter2	Head counter 2	*.* Km
9	Head Counter3	Head counter 3	*.* Km
10	Cutter Counter	Cutter counter	*
11	Thermistor	Print head temperature	0 to 255
12	Sensor Type	Sensor type	Gap I-Mark None
13	Sensor Level Low	Average minimum value of pitch sensor	*.* V
14	Sensor Level High	Average maximum value of pitch sensor	*.* V
15	Sensor Slice Level	Pitch sensor slice level	*.* V
16	FROM CHECK SUM	Printer F/W: Font: Check sum	(A)**** (B)**** (P)****
17	Sensor Out Level I-mark	I-Mark level	*
18	Sensor Out Level Gap	Gap level	*

4.4 FACTORY TEST PRINT MODE (cont'd)

Second print-out (Settings)

No.	Print Item		Contents of the print data
1	Model	Printer model name	CG408TT(*), CG412TT(*) CG408DT, CG412DT *: "T" is printed for thermal transfer print. "D" is printed for direct thermal print.
2	Offset	Base reference correction (Vertical and horizontal directions)	(H)±300 (V)±300 DOT
3	Pitch Offset	Pitch offset value	±099 DOT
4	Cut Offset	Cut position correction value	±099 DOT
5	Peel Offset	Peel off position correction value	±099 DOT
6	Tear Off Offset	Tear off position correction value	±099 DOT
7	Label Size	Label size (Pitch/Width)	(P)**** x (W)*** DOT
8	Print Speed	Print speed	50mm/s, 75mm/s, 100mm/s
9	Print Darkness	Print darkness	1A~5A
10	Sensor Type	Sensor type	Gap / I-Mark / None
11	Sensor Level Low	Average minimum value of pitch sensor	*.* V
12	Sensor Level High	Average maximum value of pitch sensor	*.* V
13	Sensor Slice Level	Pitch sensor slice level	*.* V
14	Paper End Search	Paper end detection method	TAG/ ROLL
15	Zero Slash	Zero slash	ON/ OFF
16	Proportional Pitch	Proportional pitch	ON/ OFF
17	Buzzer	Buzzer	ON/OFF
18	Initial Feed	Initial feed	ON/ OFF
19	Operation mode	Operation mode	CUT/ NONE SEPA/ TEAR OFF/ DISPENSER/ CONTINUOUS
20	Option waiting time	Option waiting time	500 to 20000 ms
21	Protocol-codes	Protocol code setting value (Standard / Nonstandard)	Nonstandard/ Standard

Third print-out (Interface)
This interface information is similar to the third print-out in user test print mode. Refer to **Section 4.3.1 Output Data of the User Test Print** for details.

4.5 OPERATION SETTING MODE

The operation setting mode enables further selection of the functions of the printer. These are:

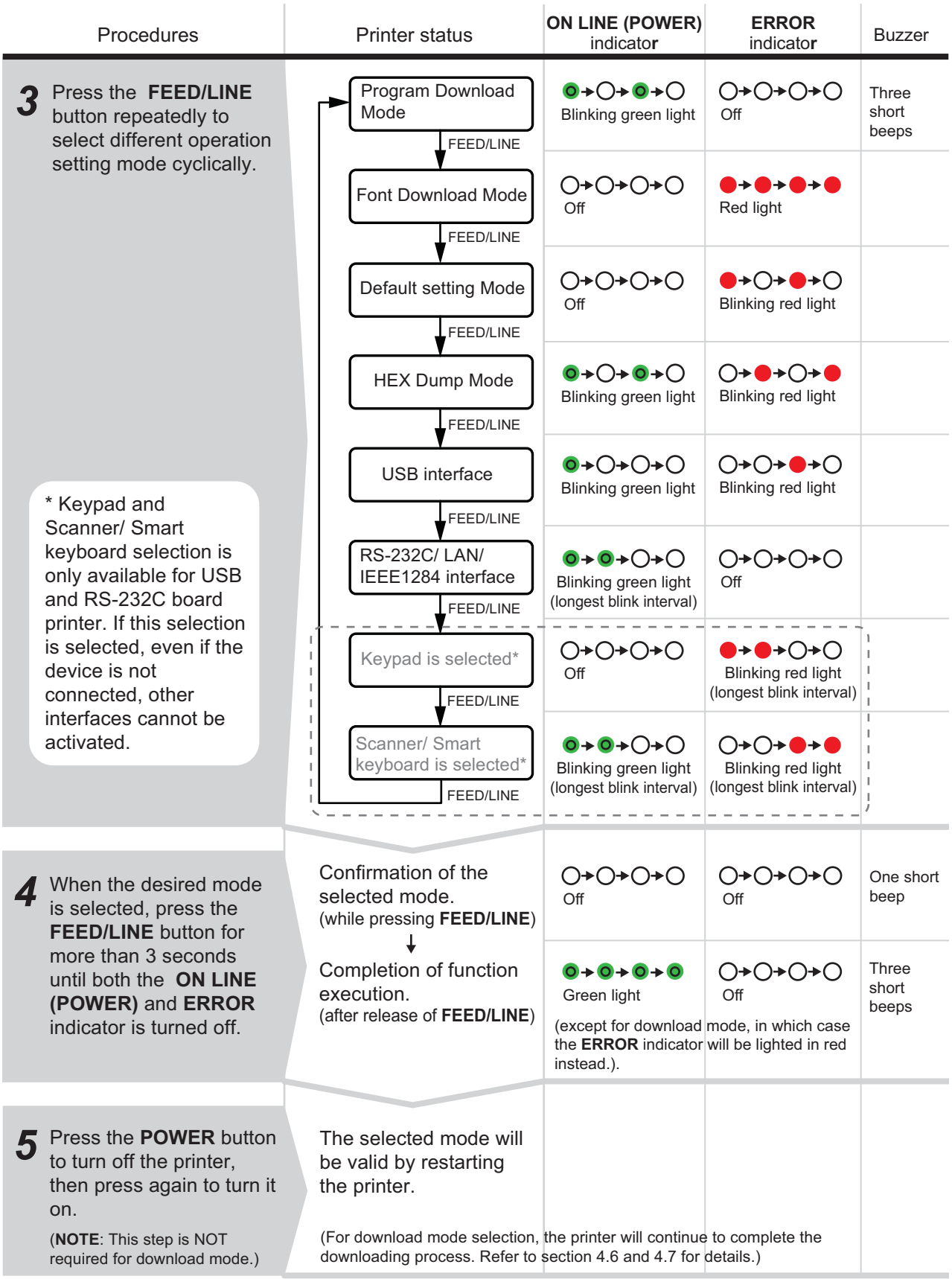
- Program download mode
- Font download mode
- Default setting mode
- HEX dump mode
- USB interface
- RS-232C/ IEEE 1284/ LAN interface
- Keypad selection
- Scanner/ Smart keyboard selection

Selection of the above operation setting modes are as shown below.

Procedures	Printer status	**ON LINE (POWER)** indicator	**ERROR** indicator	Buzzer
1 While pressing **FEED/LINE** button, press and release **POWER** button. Keep holding **FEED/LINE** button.	Printer start-up	○→○→○→○ Off	●→●→●→● Red light	
2 Release **FEED/LINE** button when **ON LINE (POWER)** indicator changes to blinking green light and three short beeps sound are heard. (The printer will cyclically advance to next mode as long as the **FEED/LINE** button is held down.)	User Test Print Mode.	◎→◎→◎→◎ Green light	○→○→○→○ Off	One short beep
	↓ Factory Test Print Mode	○→○→○→○ Off	●→●→●→● Red light	Two short beeps
	↓ Operation Setting Mode	◎→○→◎→○ Blinking green light	○→○→○→○ Off	Three short beeps

To be continued on the next page.

4.5 OPERATION SETTING MODE (cont'd)


Procedures
Printer status
ON LINE (POWER) indicator
ERROR indicator
Buzzer
3 Press the FEED/LINE button repeatedly to select different operation setting mode cyclically.
* Keypad and Scanner/ Smart keyboard selection is only available for USB and RS-232C board printer. If this selection is selected, even if the device is not connected, other interfaces cannot be activated.
Program Download Mode
Blinking green light
Off
Three short beeps
FEED/LINE
Font Download Mode
Off
Red light
Default setting Mode
Off
Blinking red light
HEX Dump Mode
Blinking green light
Blinking red light
USB interface
Blinking green light
Blinking red light
RS-232C/ LAN/ IEEE1284 interface
Blinking green light (longest blink interval)
Off
Keypad is selected*
Off
Blinking red light (longest blink interval)
Scanner/ Smart keyboard is selected*
Blinking green light (longest blink interval)
Blinking red light (longest blink interval)
4 When the desired mode is selected, press the FEED/LINE button for more than 3 seconds until both the ON LINE (POWER) and ERROR indicator is turned off.
Confirmation of the selected mode.
(while pressing FEED/LINE)
Off
Off
One short beep
Completion of function execution.
(after release of FEED/LINE)
Green light
Off
Three short beeps
(except for download mode, in which case the ERROR indicator will be lighted in red instead.).
5 Press the POWER button to turn off the printer, then press again to turn it on.
(NOTE: This step is NOT required for download mode.)
The selected mode will be valid by restarting the printer.
(For download mode selection, the printer will continue to complete the downloading process. Refer to section 4.6 and 4.7 for details.)

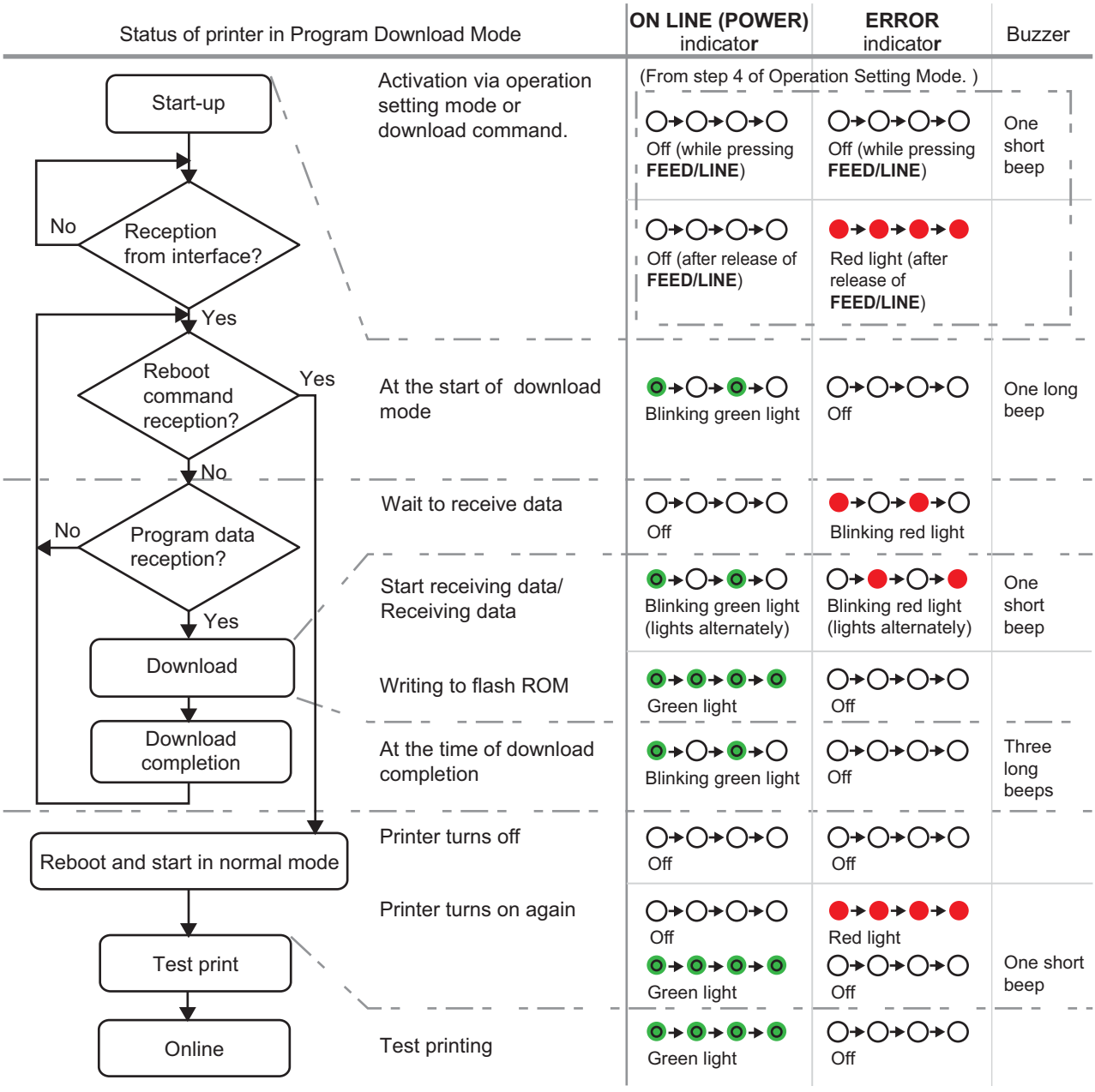
4.5 OPERATION SETTING MODE (cont'd)

Notes:

- Press the **FEED/LINE** button to select the desired function, and then execute the selected function by pressing and holding the **FEED/LINE** button for more than 3 seconds.
- When the desired interface is selected, this setting will be valid after you restart the printer.
- When HEX dump mode is selected, the printer will be set to this mode only once by restarting the printer.
- When download mode is selected, the printer will be reset automatically and it enters the desired download mode.
- When the default setting mode is selected and executed, the printer will be set to default setting.
- Make sure that the function execution is complete (**ON LINE (POWER)** indicator: Green light) before turning off the printer.

4.6 PROGRAM DOWNLOAD MODE

In this mode, the printer is set to receive an application program from the host computer to download into its memory. Remember to set the printer to the correct active interface to be used for the data transfer.



4.6 PROGRAM DOWNLOAD MODE (cont'd)

CAUTION:
- Downloading firmware will initialize all the previous settings (set by Utilities tool application or by commands). Write down its setting details or keep a copy of FACTORY TEST PRINT for your information in case you wish to maintain the same settings in the future.
- DO NOT turn the printer OFF when data is transferring to the flash ROM in Program or Boot Download mode, as it may corrupt the firmware and prevent the printer from starting up correctly.

Notes:
- Use the selected interface for PC connection.
- Restart the printer in order to activate the Downloaded program. When starting the printer in normal mode for the first time, it makes the first factory test print. If no media is set in the printer, the printer will have a paper end error.
- When not receiving reboot command, manually reboot the printer and restart in normal operation mode.
- Ensure that the printer is in the "Wait to receive data" status (**ERROR** indicator: blinking red light) before you manually turn off the printer.
- During the process of downloading, if **ON LINE (POWER)** and **ERROR** indicators respond differently from above mentioned procedure, an error may have occurred. Please refer to **Section 4.11 Error Occurrence While Downloading** for details.

4.6.1 Firmware Download

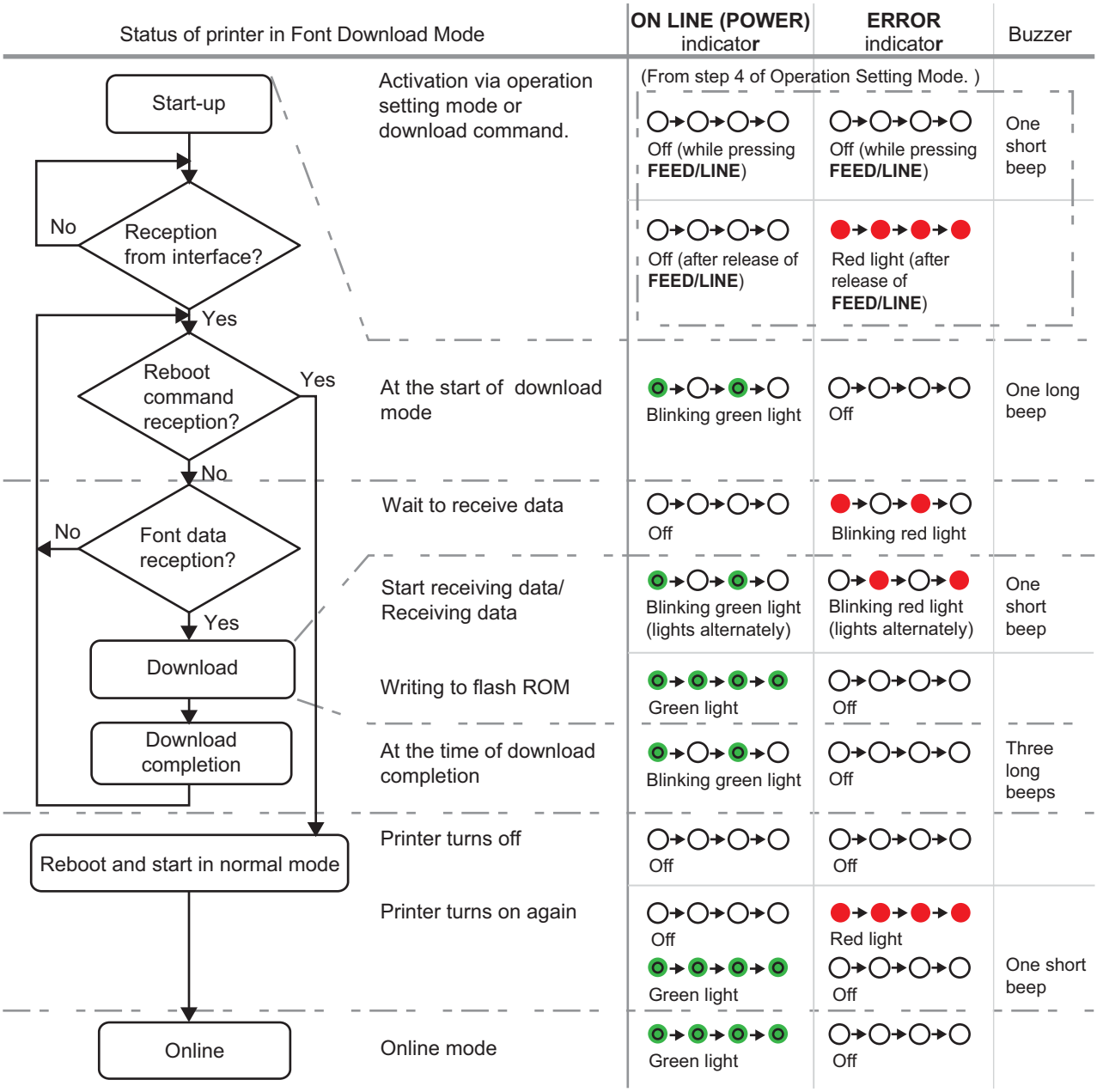
The following listed the downloadable firmware according to the connected interface.

	Targeted firmware	
Interface	Printer firmware	Keypad firmware
RS-232C	❍	–
USB	❍	–
Onboard LAN	❍	–
IEEE 1284	❍	–
SD card for Keypad	x	❍

❍: Downloadable x: Undownloadable –: Not available

4.7 FONT DOWNLOAD MODE

In this mode, the printer is set to download fonts from the host computer. Remember to set the printer to the correct active interface to be used for the data transfer.



Notes:

- Use the selected interface for PC connection.
- The downloaded font goes into effect when you restart the printer.
- When not receiving reboot command, manually reboot the printer and restart in normal operation mode.
- Ensure that the printer is in the “Wait to receive data” status (**ERROR** indicator: blinking red light) before you manually turn off the printer.
- During the process of downloading, if **ON LINE (POWER)** and **ERROR** indicators respond differently from above mentioned procedure, an error may have occurred. Please refer to **Section 4.11 Error Occurrence While Downloading** for details.

4.8 DEFAULT SETTING MODE

When default setting mode is selected and executed in Operation Setting mode (refer to **Section 4.5 Operation Setting Mode**), the printer will reset to the default setting (factory preset) as listed below.

No.	Items to be reset		Default value
1	Offset (V, H)		Vertical = 0 dot, Horizontal = 0 dot
2	Pitch Offset		0 dot
3	Cut Offset		0 dot
4	Dispensing Offset		0 dot
5	Tear-Off Offset		0 dot
6	Label Size		Pitch 896 dot x Width 832 dot [203 dpi] Pitch 1344 dot x Width 1248 dot [305 dpi]
7	Print Speed		75 mm/sec (3 Inches/sec)
8	Print Darkness		3A
9	Sensor Type		Gap
10	Paper End Search		Roll
11	Zero Slash		Enabled
12	Proportional Pitch		Enabled
13	Initial Feed		Disabled
14	Auto Feed		Disabled
15	Operation mode	Continuous	- (No setting)
		Tear Off	- (No setting)
		Cutter	Mode 1 (Head position)
		Dispenser	Mode 1 (Head position)
16	Interface	RS-232C	Baud rate=19200 bps, Protocol = Protocol for driver
		LAN	Protocol for driver (ENQ response mode) *1
		IEEE 1284	Protocol = Protocol for driver
		USB	Protocol = Protocol for driver

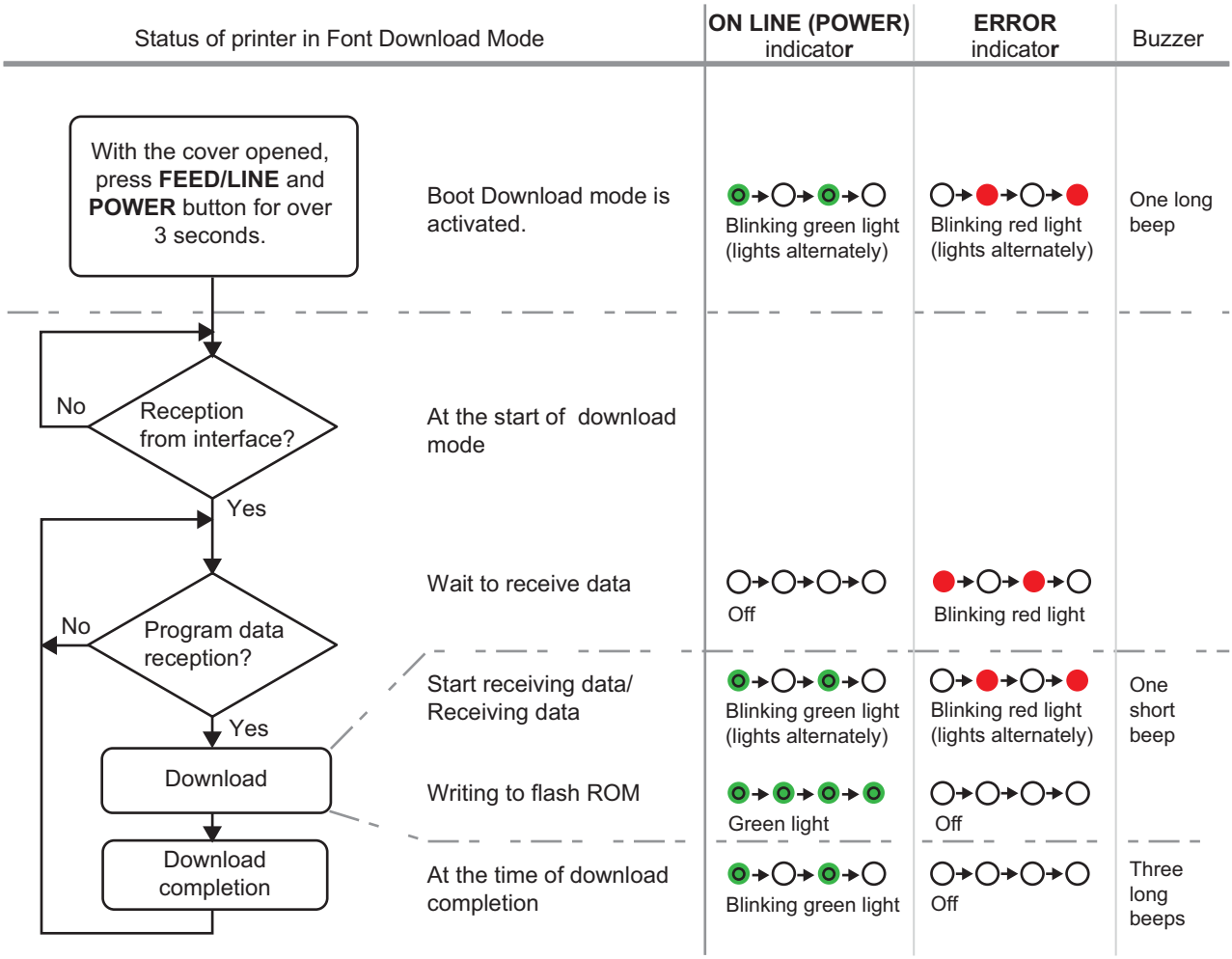
*1. To be connected by Port1024 and Port1025 (2 port connections) or Port 9100 (1 port connection)

4.9 HEX DUMP MODE

HEX Dump Mode allows you to print the contents of the receive buffer in a hexadecimal format. This feature allows the data stream to be examined for errors and troubleshooting.
After selecting the HEX Dump Mode in Operation Setting Mode, restart the printer (refer to **Section 4.5 Operation Setting Mode**). The printer then awaits data feeds and when data arrives, it prints out the HEX data continuously.
To exit the HEX Dump Mode, restart the printer by turning off the printer and then on again.

4.10 BOOT DOWNLOAD MODE

In this boot download mode, the operator can download and replace the entire boot section of the firmware in the Flash ROM memory. This is a critical mode meant only to be handled by experienced operators. Avoid using this mode if you are not clear about its function.



CAUTION:

- Downloading firmware will initialize all the previous settings (set by Utilities tool application or by commands). Write down its setting details or keep a copy of FACTORY TEST PRINT for your information in case you wish to maintain the same settings in the future.
- DO NOT turn the printer OFF when data is transferring to the flash ROM in Program or Boot Download mode, as it may corrupt the firmware and prevent the printer from starting up correctly.

Notes:

- Use the selected interface for PC connection.
- Restart the printer in order to activate the Downloaded program.
- Ensure that the printer is in the “Wait to receive data” status (**ERROR** indicator: blinking red light) before you manually turn off the printer.
- During the process of downloading, if **ON LINE (POWER)** and **ERROR** indicators respond differently from above mentioned procedure, an error may have occurred. Please refer to **Section 4.11 Error Occurrence While Downloading** for details.

4.11 ERROR OCCURRENCE WHILE DOWNLOADING

The following are the possible causes of errors in program/font download.
(1) The flash ROM may be in a state that fails to permit data being written to it.
(2) Incorrect data are received while transferring downloaded data.

4.11.1 Operation Status when having an Error in Downloading Process

The **ERROR** indicator and buzzer response when having an error in downloading process are as follows.

Operation status	**ON LINE (POWER)** indicator	**ERROR** indicator	Buzzer
Flash ROM error	Off ○→○→○→○	Red light ●→●→●→●	1 long beep sound
Download data error	Off ○→○→○→○	Long blink interval ●→●→○→○	1 long beep sound

CAUTION:
- DO NOT turn the printer OFF when data is transferring to the flash ROM in Program or Boot Download mode, as it may corrupt the firmware and prevent the printer from starting up correctly.
- Ensure to check the printer status when downloading, and do not turn off the printer during download.
- Ensure that the printer is running on a stable power supply during flash ROM writing operations.

4.12 FACTORY CLEAR MODE

The printer has integrated counters to measure the accumulative activity of some features. These includes head counter, cutter counter and all counter.
You have to reset the measurement of these counters to zero whenever the counterpart has been replaced.
Selection and activation of the above Factory Clear modes are as shown below.

Procedures	Printer status	ON LINE (POWER) indicator	ERROR indicator	Buzzer
1 With top cover open, while pressing the **FEED/LINE** button, press and release the **POWER** button.	Printer start-up	Off	Red light	
2 Release the **FEED/LINE** button after the next second when you hear a short beep sound.	Factory Clear Mode (The printer will cyclically advance to next mode as long as the **FEED/LINE** button is held down.)	Off	Red light	One short beep
3 Press the **FEED/LINE** button repeatedly to select different factory clear mode cyclically.	Head Counter Clear	Off	Red light	One short beep
	Cutter Counter Clear	Off	Blinking red light	
	All Clear	Blinking green light	Blinking red light	
4 When the desired mode is selected, press the **FEED/LINE** button for more than 3 seconds until the **ON LINE (POWER)** and ERROR indicators are turned off. Then, close the top cover to perform factory clear.	Confirmation of the selected mode.	Off	Off	One short beep
	Completion of factory clear execution.	Changes to green light after closing the top cover.	Off	Three long beep
	Factory Test Print mode is activated and then paused.	Blinking green light	Off	
5 Press **FEED/LINE** button to start test printing.	User Test Print start and print continuously.	Green light	Off	
Press **FEED/LINE** button to pause the test printing. Press again to resume.	User Test Print paused.	Blinking green light	Off	

4.12 FACTORY CLEAR MODE (cont'd)

4.12.1 Contents of Factory Clear (Head Counter Clear)

Executing factory clear (Head counter clear) will set the following items to factory default.

No.	Items to be initialized	Setting value
1	Head counter 1	0.0Km
2	Head counter 2	0.0Km
3	Head counter 3	0.0Km

4.12.2 Contents of Factory Clear (Cutter Counter Clear)

Executing factory clear (Cutter counter clear) will set the following items to factory default.

No.	Items to be initialized	Setting value
1	Cutter counter	0

4.12.3 Contents of Factory Clear (All Clear)

Executing factory clear (All clear) will set the following items to factory default.

No.	Items to be initialized	Setting value
1	Head counter 1	0.0Km
2	Head counter 2	0.0Km
3	Head counter 3	0.0Km
4	Cutter counter	0
5	Offset (V, H)	Vertical = 0 dot, Horizontal = 0 dot
6	Pitch Offset	0 dot
7	Cut Offset	0 dot
8	Dispensing Offset	0 dot
9	Tear-Off Offset	0 dot
10	Label Size	Pitch 896 dot x Width 832 dot [203 dpi] Pitch 1344 dot x Width 1248 dot [305 dpi]
11	Print Speed	75 mm/sec (3 Inches/sec)
12	Print Darkness	3A
13	Sensor Type	Gap
14	Paper End Search	Roll
15	Zero Slash	Enabled
16	Proportional Pitch	Enabled
17	Buzzer	Enabled

4.12 FACTORY CLEAR MODE (cont'd)

No.	Items to be initialized		Setting value
18	Initial Feed		Disabled
19	Auto Feed		Disabled
20	Operation mode	Continuous	- (No setting)
		Tear-Off	- (No setting)
		Cutter	Mode 1 (Head position)
		Dispenser	Mode 1 (Head position)
		Nonsepa (Linerless)	Mode 2 (Tear off position)
21	Interface	RS-232C	Baud rate=19200 bps, Data bit=8 bit, Parity=None, Stop bit=1 bit, Protocol=Protocol for driver
		LAN	Protocol for driver (ENQ response mode) *1
		USB	- (No initial setting)
22	Tear Off Waiting Time		1000 ms

*1. To be connected by Port1024 and Port1025 (2 port connections) or Port 9100 (1 port connection)

4.13 FACTORY ADJUSTMENT MODE

The I-Mark and Gap sensor threshold levels are adjusted automatically in the Factory Adjustment mode. In this automatic adjustment, I-Mark and GAP sensors will be adjusted continuously. Proceed the following instructions to perform the adjustment.
Preparation: Load in the test labels compatible with I-Mark and Gap sensors.

Procedures	Printer status	ON LINE (POWER) indicator	ERROR indicator	Buzzer
1 With top cover open, while pressing the **FEED/LINE** button, press and release the **POWER** button.	Printer start-up	Off	Red light	
2 Keep holding the **FEED/LINE** button and release it when the **ERROR** indicator changes to blinking red light and a short beep sound is heard.	Factory Clear Mode	Off	Red light	One short beep
	Factory Adjustment Mode	Off	Blinking red light	Two short beeps
	(The printer will cyclically advance to next mode as long as the **FEED/LINE** button is held down.)			
3 Close the top cover and press the **FEED/LINE** button for more than 3 seconds until the **ON LINE (POWER)** and **ERROR** indicators are turned off.	Confirmation of the selected mode.	Off (while pressing FEED/LINE)	Off (while pressing FEED/LINE)	One short beep
	Enters the sensor adjustment mode.	Off	Red light	
	Ready for the I-Mark sensor adjustment.	Blinking green light	Off	
4 Press the **FEED/LINE** button to execute the I-Mark sensor output adjustment.	The printer will feed at least 3 labels to adjust the I-Mark sensor automatically.	Green light	Off	
	The printer is paused and is ready for the Gap sensor adjust-ment.	Blinking green light	Off	

To be continued on the next page.

4.13 FACTORY ADJUSTMENT MODE (cont'd)

Procedures	Printer status	ON LINE (POWER) indicator	ERROR indicator	Buzzer
5 Press the **FEED/LINE** button to execute the Gap sensor output adjustment.	The printer will feed at least 3 labels to adjust the Gap sensor auto-matically.	Green light	Off	
	The printer is paused and is ready for the Factory Test printing.	Blinking green light	Off	
6 Press **FEED/LINE** button to start test printing.	Factory Test Print start and print continuously.	Green light	Off	
Press **FEED/LINE** button to pause the test printing. Press again to resume.	Factory Test Print paused.	Blinking green light	Off	

Notes:

- Restart the printer by pressing the **POWER** off and then on, the setting is then saved.
- If you missed the chance to release the **FEED/LINE** button in step 2 above, just keep holding the **FEED/LINE** button and wait for the next cycle.
- If you released the **FEED/LINE** button at the wrong **ON LINE (POWER)** indicator, just turn off the power and restart the procedure.
- If an error occurred during adjustment, open the top cover once. Then press the **FEED/LINE** button after closing the top cover to restart the adjustment.
- The printer will continuously print the Factory test labels until the **FEED/LINE** button is pressed. The printing is paused and will resume printing if the **FEED/LINE** button is press again.

4.13 FACTORY ADJUSTMENT MODE (cont'd)

4.13.1 Output Data of the Factory Adjustment Test Print

The output data of the Factory Adjustment Test Print shows the internal operating parameters of the printer. These output data are printed in three parts, each with the printing area of 115 mm [3.54"] (Width) x 115 mm [3.54"] (Pitch), Standard.

First print-out

No.	Print Item		Contents of the print data
1	Model	Printer model name	CG408TT(*), CG412TT(*) CG408DT, CG412DT *: "T" is printed for thermal transfer print. "D" is printed for direct thermal print.
2	Firm Date	Printer F/W creation date	YY.MM.DD
3	Firm Version	Printer F/W version	39.**.**.**
4	Barcode of firm version	Printer F/W version (Barcode)	Print in CODE39
5	Font Version	Font version	**.**(R)
6	Barcode of font version	Font version (Barcode)	Print in CODE39
7	CONT/USB Serial	USB serial No.	********
8	Barcode of CONT/USB Serial	USB serial No. (Barcode)	Print in CODE39

Second print-out

No.	Print Item		Contents of the print data
1	Model	Printer model name	CG408TT(*), CG412TT(*) CG408DT, CG412DT *: "T" is printed for thermal transfer print. "D" is printed for direct thermal print.
2	CONT/USB Serial	USB serial No.	********
3	Interface 1	Interface 1	USB
4	Interface 2	Interface 2	LAN/RS-232C/IEEE1284
5	FROM1 CHECK SUM	Printer F/W: Font: Checksum	(B)**** (P)**** (F)**** (A)****
6	Barcode of FROM1 CHECK SUM	Barcode of Printer F/W: Font: checksum	Print in CODE39
7	Barcode of MAC Address *1	Barcode of MAC address.	Print in CODE39

*1 Printed by LAN model only.

4.13 FACTORY ADJUSTMENT MODE (CONT'D)

Third print-out

No.	Print Item		Contents of the print data
1	Model	Printer model name	CG408TT(*), CG412TT(*) CG408DT, CG412DT *: "T" is printed for thermal transfer print. "D" is printed for direct thermal print.
2	CONT/USB Serial	USB serial No.	********
3	Life Counter	Life counter	*.* Km
4	Head Counter1	Head counter1	*.* Km
5	Head Counter2	Head counter2	*.* Km
6	Head Counter3	Head counter3	*.* Km
7	Cutter Counter	Cutter counter	********
8	Offset	Pitch offset value (Vertical/ Horizontal directions)	(H)±*** (V)±***
9	Cut Offset	Cut position offset value	±*** DOT
10	Peel Offset	Peel off position offset value	±*** DOT
11	TearOff Offset	Tear off position offset value	±*** DOT
12	Label Size	Label size (Pitch/Width)	(P)**** x (W)*** DOT
13	Thermistor	Print head temperature	***
14	Print Mode	Operation mode	CONTINUOUS TEAR OFF CUT DISPENSER NON SEPA
15	Sensor Type	Sensor type (I-Mark/ Gap)	I-Mark Gap None
16	Sensor Level Low	Average minimum value of pitch sensor	*.* V
17	Sensor Level High	Average maximum value of pitch sensor	*.* V
18	Sensor Slice Level	Pitch sensor slice level	*.* V
19	Print Speed	Print speed	50mm/s 75mm/s 100mm/s
20	Print Darkness	Print darkness	1A~5A

4.14 FACTORY USB INTERFACE MODE

This mode enables the printer to connect multiple printers to a single USB port of the host computer.

Procedures	Printer status	ON LINE (POWER) indicator	ERROR indicator	Buzzer
1 With top cover open, while pressing the **FEED/LINE** button, press and release the **POWER** button.	Printer start-up	Off	Red light	
2 Keep holding the **FEED/LINE** button and release it when the **ON LINE (POWER)** indicator changes to green light and three short beep sound is heard. (The printer will cyclically advance to next mode as long as the **FEED/LINE** button is held down.)	Factory Clear Mode ↓ Factory Adjustment Mode ↓ Factory USB Interface Mode The printer enters factory USB interface mode as soon as the **FEED/LINE** button is released.	Off ↓ Off ↓ Green light	Red light ↓ Blinking red light ↓ Off	One short beep Two short beeps Three short beeps
3 Close the top cover.	Online mode.	Green light	Off	

In factory USB interface mode, the printer motion will be based on the normal mode. In this case, the returned contents of descriptors shown below are different because serial number is not returned.
USB will be selected automatically regardless of interface you specified.

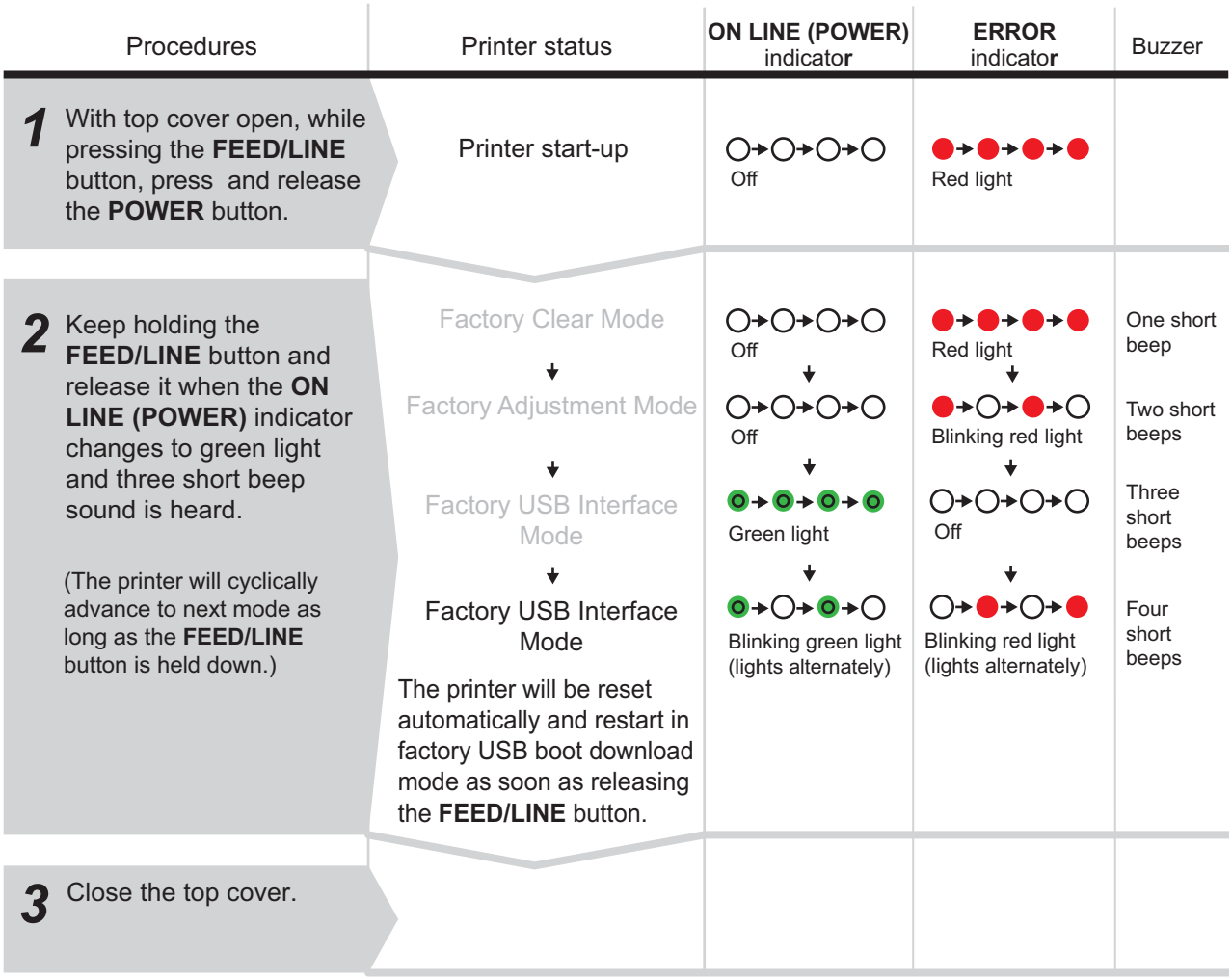
Descriptor type	Offset	Field	When starting in normal mode	When starting in this mode
Device descriptor	16	iSerialNumber	0x03	0x00

Notes:

- If you missed the chance to release the **FEED/LINE** button in step 2 above, just keep holding the **FEED/LINE** button and wait for the next cycle.
- If you released the **FEED/LINE** button at the wrong **ON LINE (POWER)** indicator, just turn off the power and restart the procedure.

4.15 FACTORY USB BOOT DOWNLOAD MODE

This mode enables the printer to connect multiple printers to a single USB port of the host computer.


Procedures
Printer status
ON LINE (POWER) indicator
ERROR indicator
Buzzer
1 With top cover open, while pressing the FEED/LINE button, press and release the POWER button.
Printer start-up
Off
Red light
2 Keep holding the FEED/LINE button and release it when the ON LINE (POWER) indicator changes to green light and three short beep sound is heard.
(The printer will cyclically advance to next mode as long as the FEED/LINE button is held down.)
Factory Clear Mode
Off
Red light
One short beep
Factory Adjustment Mode
Off
Blinking red light
Two short beeps
Factory USB Interface Mode
Green light
Off
Three short beeps
Factory USB Interface Mode
Blinking green light (lights alternately)
Blinking red light (lights alternately)
Four short beeps
The printer will be reset automatically and restart in factory USB boot download mode as soon as releasing the FEED/LINE button.
3 Close the top cover.

In factory USB boot download mode, the printer motion will be based on the boot download mode. In this case, the returned contents of descriptors shown below are different because serial number is not returned. USB will be selected automatically regardless of interface you specified.

If executing auto reboot in factory USB boot download mode, the printer will be activated in factory USB interface mode.

Descriptor type	Offset	Field	When starting in normal mode	When starting in this mode
Device descriptor	16	iSerialNumber	0x03	0x00

Notes:

- If you missed the chance to release the **FEED/LINE** button in step 2 above, just keep holding the **FEED/LINE** button and wait for the next cycle.
- If you released the **FEED/LINE** button at the wrong **ON LINE (POWER)** indicator, just turn off the power and restart the procedure.

4.16 PRINTER CONFIGURATIONS SETTING

You can set the printer configuration by sending SBPL commands from the host computer or by using the Utilities Tool application provided (SATO Accessory CD-ROM).

No.	Category	Setting item	Setting contents
1	Operation mode	Print method (CG408TT/ CG412TT printer only)	Thermal Transfer/ Direct Thermal
2		Print speed	50mm/s to 100mm/s
3		Print mode	Continuous/ Tear Off/ Cutter/ Dispenser/ Nonesepa (Linerless)
4		Cutter mode	Head position/ Cut position/ No backfeed
5		Dispenser mode	Head position/ Dispense position
6		Nonesepa mode	Tear Off position/ No backfeed
7		Print darkness	A
8		Print darkness level	1 to 5
9		Sensor type	I-Mark/Gap/Sensor-off/Transmissive (CX compatible)
10		Zero slash	Disabled/ Enabled
11		Kanji code	JIS code/SJIS code
12		Initial feed	Disabled/ Enabled
13		Character pitch	Fixed/ Proportional
13		Option Waiting time	5 to 200 (x100ms)
14	Media size	Pitch	1 to 2400 dots (including liner/backing paper) [CG408TT/DT] 1 to 3600 dots (including liner/backing paper) [CG412TT/DT]
15		Width	1 to 832 dots (including liner/backing paper) [CG408TT/DT] 1 to 1248 dots (including liner/backing paper) [CG412TT/DT]
16	Base reference point	Vertical print position offset	±792dot
17		Horizontal print position offset	±792dot
18	Offset setting	Continuous mode	±99dot
19		Tear Off mode	±99dot
20		Cutter mode	±99dot
21		Dispenser mode	±99dot

No.	Category	Setting item	Setting contents
22	RS-232C interface *1	Baud rate	9600/19200/38400bps
23		Data bit	7/8 bit
24		Parity	No parity/Odd number/Even number
25		Stop bit	1/2 bit
26		Control	READY/BUSY control (single item buffer), READY/BUSY control (multi buffer), Xon/Xoff, Protocol for driver(STATUS4), STATUS3
27	LAN interface *2	LAN mode	Protocol for driver(STATUS4)Cyclic response *3 Protocol for driver(STATUS4)ENQ response *3 1 port connection/ENQ response(STATUS3)
28	IEEE 1284 interface *4	Buffer type	Multi/ 1 item
		ACK width	010 to 200 (1=50ns)
28	Non-standard code	Nonstandard code switching	Standard code/Nonstandard code
29		Nonstandard code setting	Nonstandard code settings for STX, ETX, ESC, ENQ, CAN, NULL, OFFLINE
30	Download	Firmware download	Download firmware from the host computer.
31		Reboot mode *5	(1) Start up in program download mode (Available in normal operation mode only) (2) Start up in normal operation mode (Available in program download mode only)

*1. Available for USB+RS-232C specification only.
*2. Available for USB+LAN specification only.
*3. Use SATO port or Port 9100 when sending print request from the printer driver.
*4. Available for IEEE1284+USB specification only.
*5. The printer will restart in specified mode.

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5

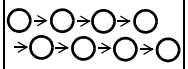
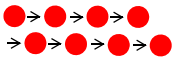
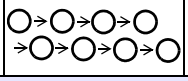
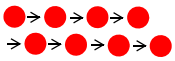
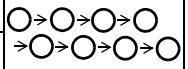
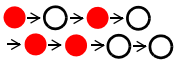
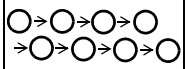
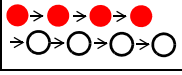
TROUBLESHOOTING

If you are unable to produce printouts on the CG4 Series printer, use this section to make sure the basics have been checked, before deciding you are unable to proceed any further.
This section is divided into four parts:

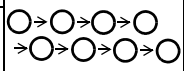
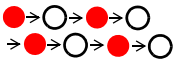
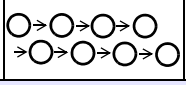
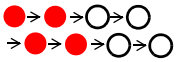
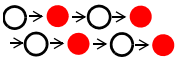
- 5.1 Error Signal Troubleshooting
- 5.2 Troubleshooting Flowchart
- 5.3 Interface Troubleshooting
- 5.4 Test Print Troubleshooting

5.1 ERROR SIGNAL TROUBLESHOOTING

The **ON LINE (POWER)** and **ERROR** indicators light or flash in different colors and patterns listed below to alert user that an error has occurred on the printer. [Indicator sequence (as shown from left to right): ○Off, ●Red light, ◎Green light]

Contents	ON LINE (POWER) LED	ERROR LED	Buzzer	Causes	Corrective Actions
Hardware error					
FLASH ROM error	Off 	Solid red 	1 long beep sound	1) FLASH ROM read/ write error. 2) Exceeded the FLASH ROM write count limits.	1), 2) Board replacement.
Setting information (FROM) error				1) FLASH ROM read/write error. 2) Exceeded the FLASH ROM write count limits.	1), 2) Board replacement.
Machine error				1) Board defect.	1) Board replacement.
Calendar error				1) Wrong date/time data ia read from calendar IC	1) Check to see if calendar IC is installed or not 2) Board replacement.
Program error					
Incorrect program error	Off 	Solid red 	—	1) Download did not complete successfully.	1) Download again.
Communication error					
Communication error by kit	Off 	[Red->Off] x twice ->Red x twice->Off (blinks with changing interval) 	1 long beep sound	Error contents may vary depending on the kit installed.	
Buffer over				1) Received the amount of data exceeding the limit of receive buffer. 2) Wrong protocol.	1) Correct the software on the host side. 2) Set the correct protocol.
Download error					
Download error	Off 	Red x 4 times ->Off (longest blink interval) 	1 long beep sound	1) Downloaded wrong data.	1) Download again.

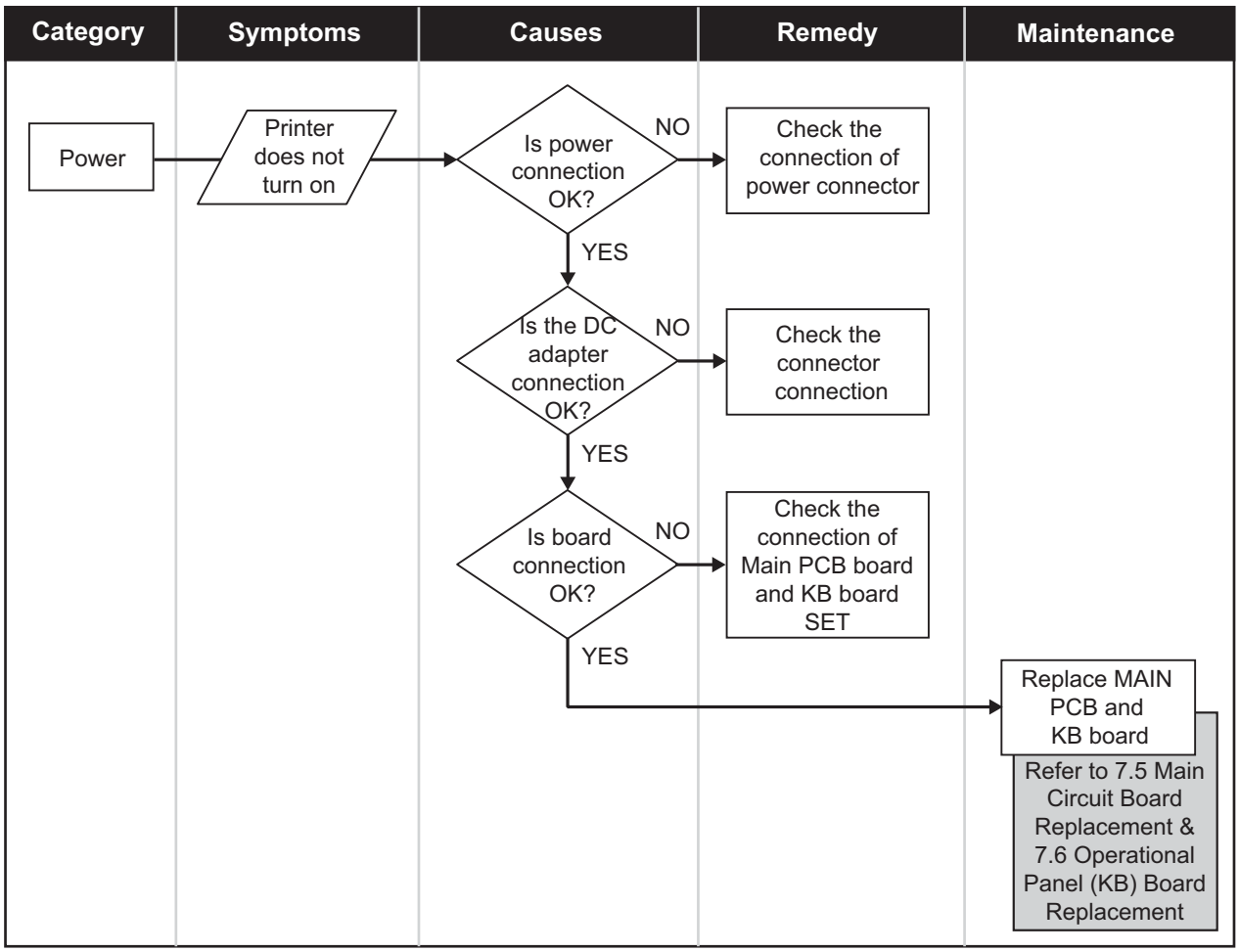
5.1 ERROR SIGNAL TROUBLESHOOTING (cont'd)

Contents	ON LINE (POWER) LED	ERROR LED	Buzzer	Causes	Corrective Actions
Minor error					
Cover open	Off	Blinking red	3 short beeps sound	1) Cover is not closed properly.	1) Close the cover.
Sensor error				1) Wrong sensor level. 2) Wrong sensor type. 3) The value set for pitch offset is too big. 4) Label meandering.	1) Level adjustment. 2) Sensor type adjustment. 3) Set a smaller value for the pitch offset.
Paper end				1) Out of paper.	1) Set the paper properly.
Ribbon end				1) Out of ribbon or ripped ribbon. 2) Ribbon is not set properly.	1) & 2) Set the ribbon properly.
Option					
Cutter error	Off 	long blink interval 	3 short beeps sound	1) Cutter is not connected. 2) Cut operation was not performed successfully.	1) Connect the cutter unit. 2) Set and feed the paper again.
Warning					
Buffer near full	Blinking green (Lights alternately)	Blinking red (Lights alternately)	—	1) Free space for receive buffer is low.	1) Pause the data transmission on the host side and wait until enough buffer space available.
Ribbon near end			—	1) Not much ribbon left.	1) Replace ribbon.

5.2 TROUBLESHOOTING FLOWCHART

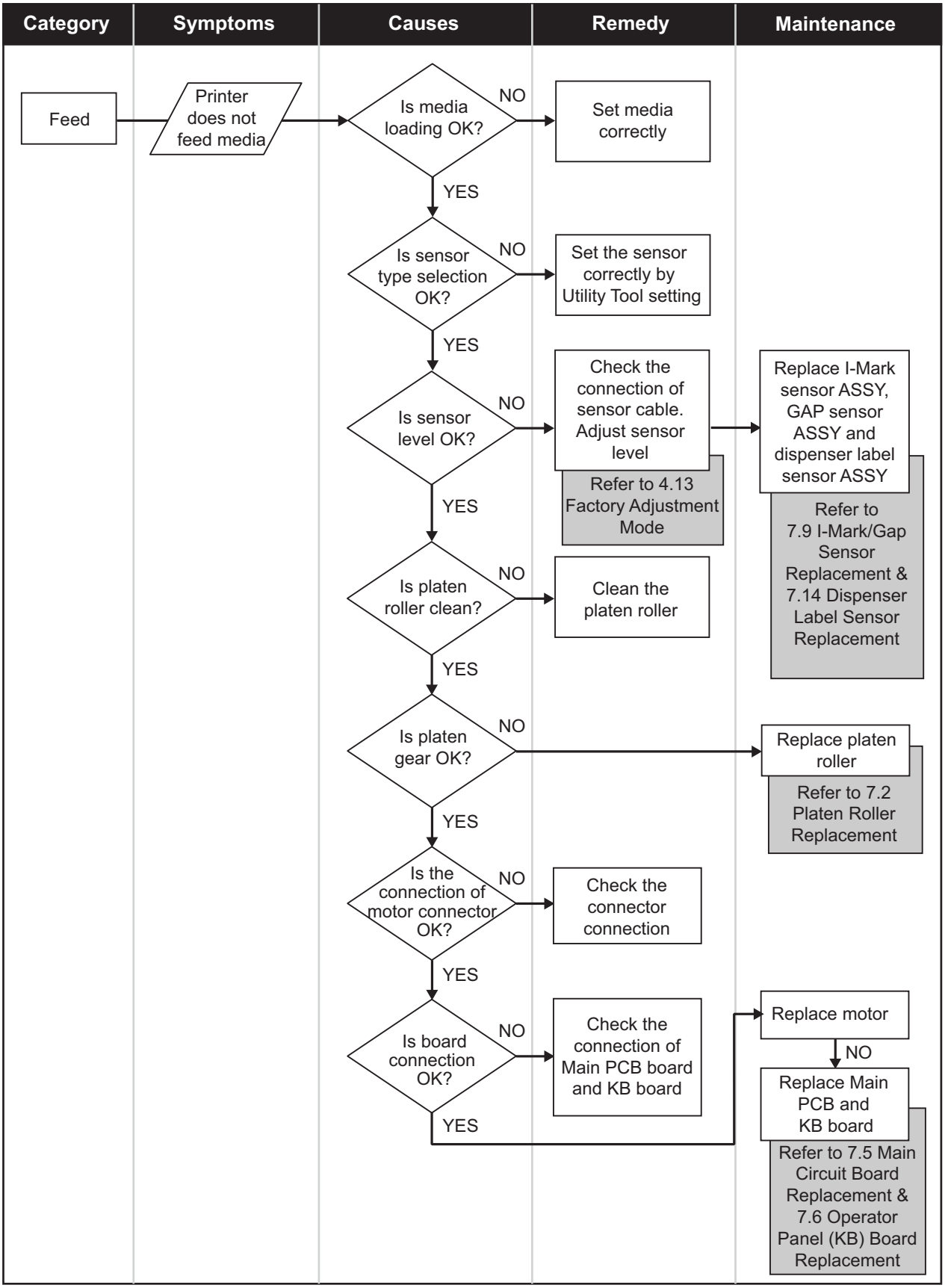
When a problem occurs, the solution can be easily traced using the following troubleshooting flowcharts in this section. These flowcharts are categorised by different problems and its symptoms, probable causes, and suggested corrective actions.

5.2.1 Power Problem



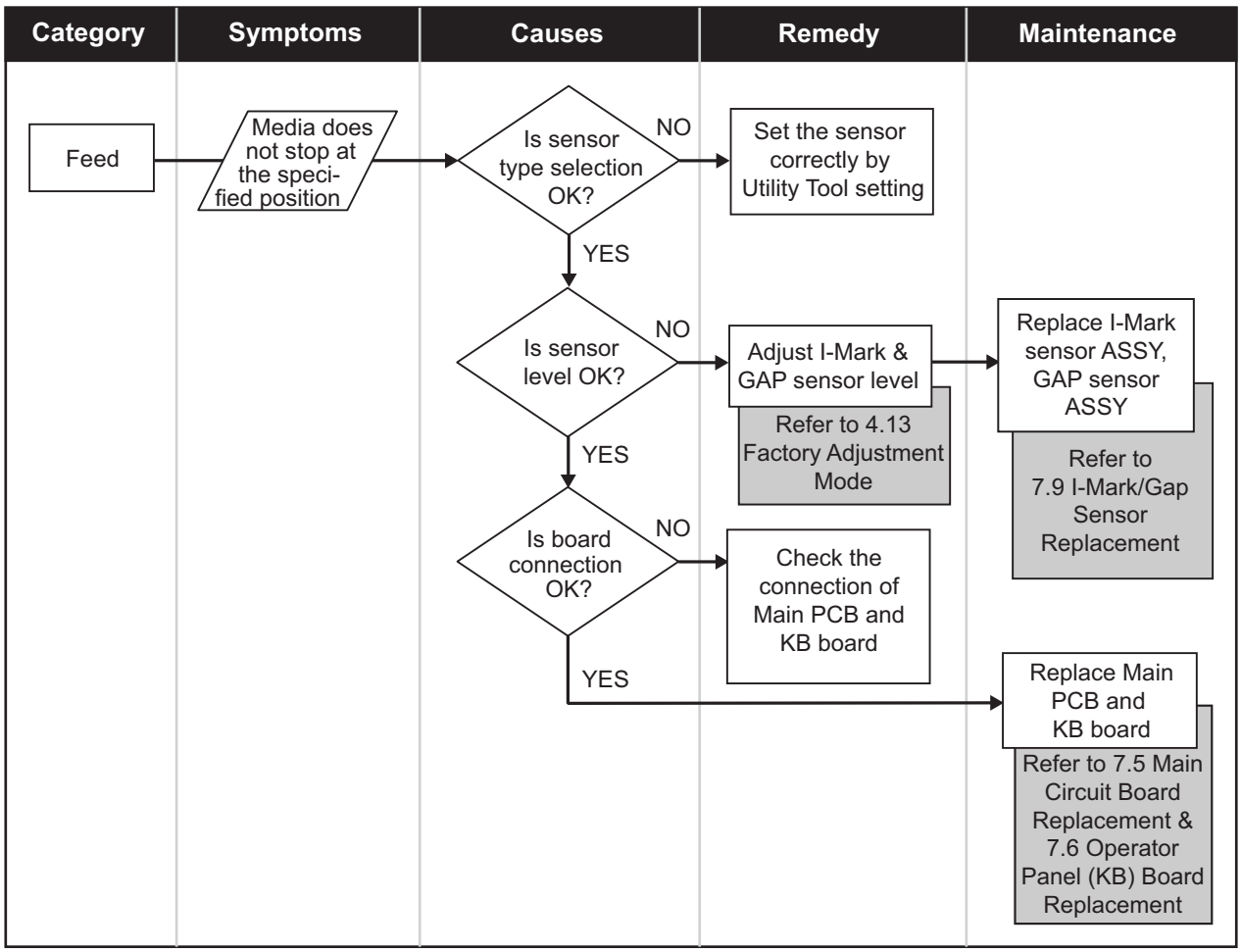
5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.2 Feed Problems



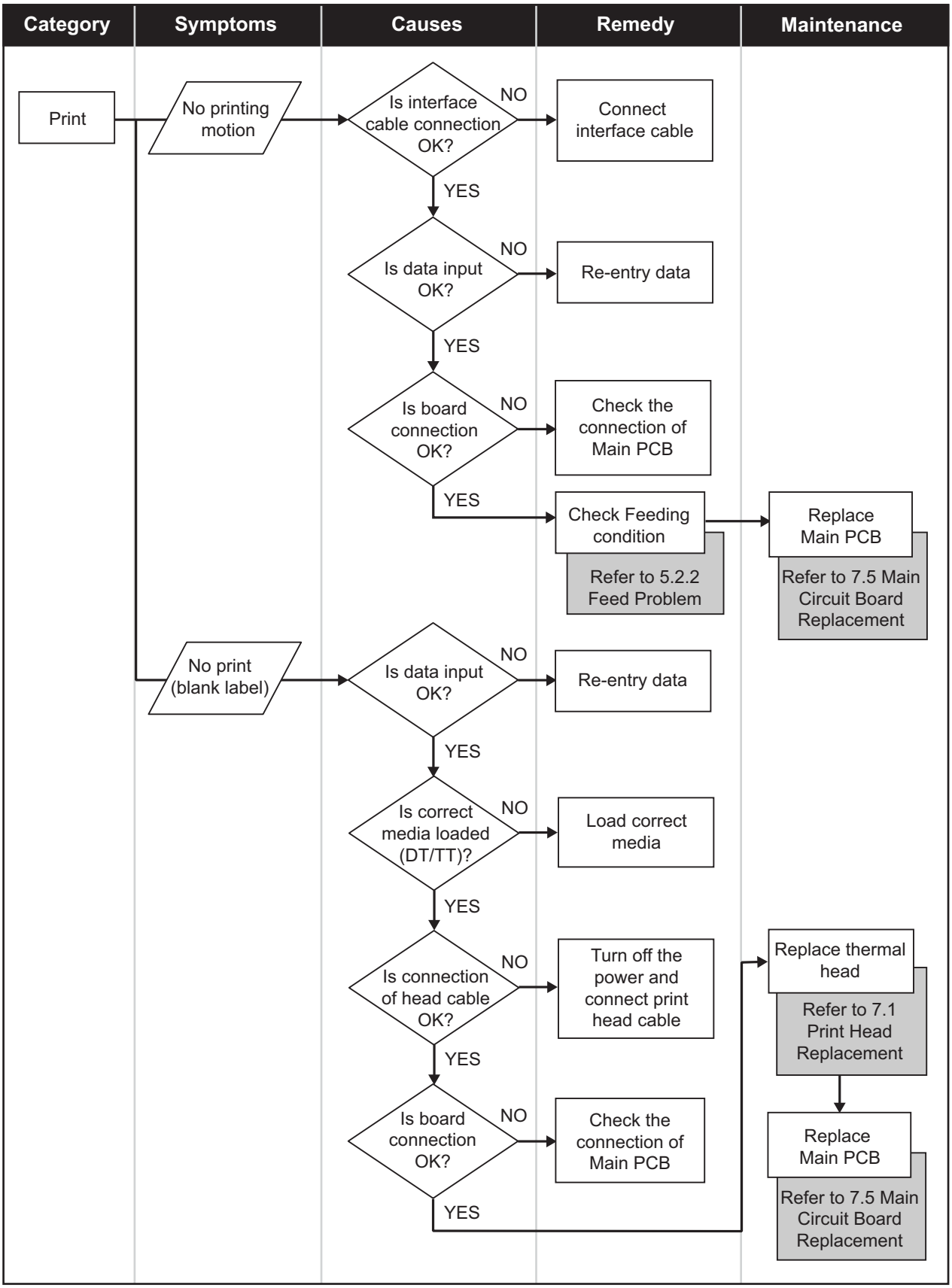
5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.2 Feed Problems (cont'd)


Category
Symptoms
Causes
Remedy
Maintenance
Feed
Media does not stop at the specified position
Is sensor type selection OK?
NO
Set the sensor correctly by Utility Tool setting
YES
Is sensor level OK?
NO
Adjust I-Mark & GAP sensor level
Refer to 4.13 Factory Adjustment Mode
Replace I-Mark sensor ASSY, GAP sensor ASSY
Refer to 7.9 I-Mark/Gap Sensor Replacement
YES
Is board connection OK?
NO
Check the connection of Main PCB and KB board
YES
Replace Main PCB and KB board
Refer to 7.5 Main Circuit Board Replacement & 7.6 Operator Panel (KB) Board Replacement

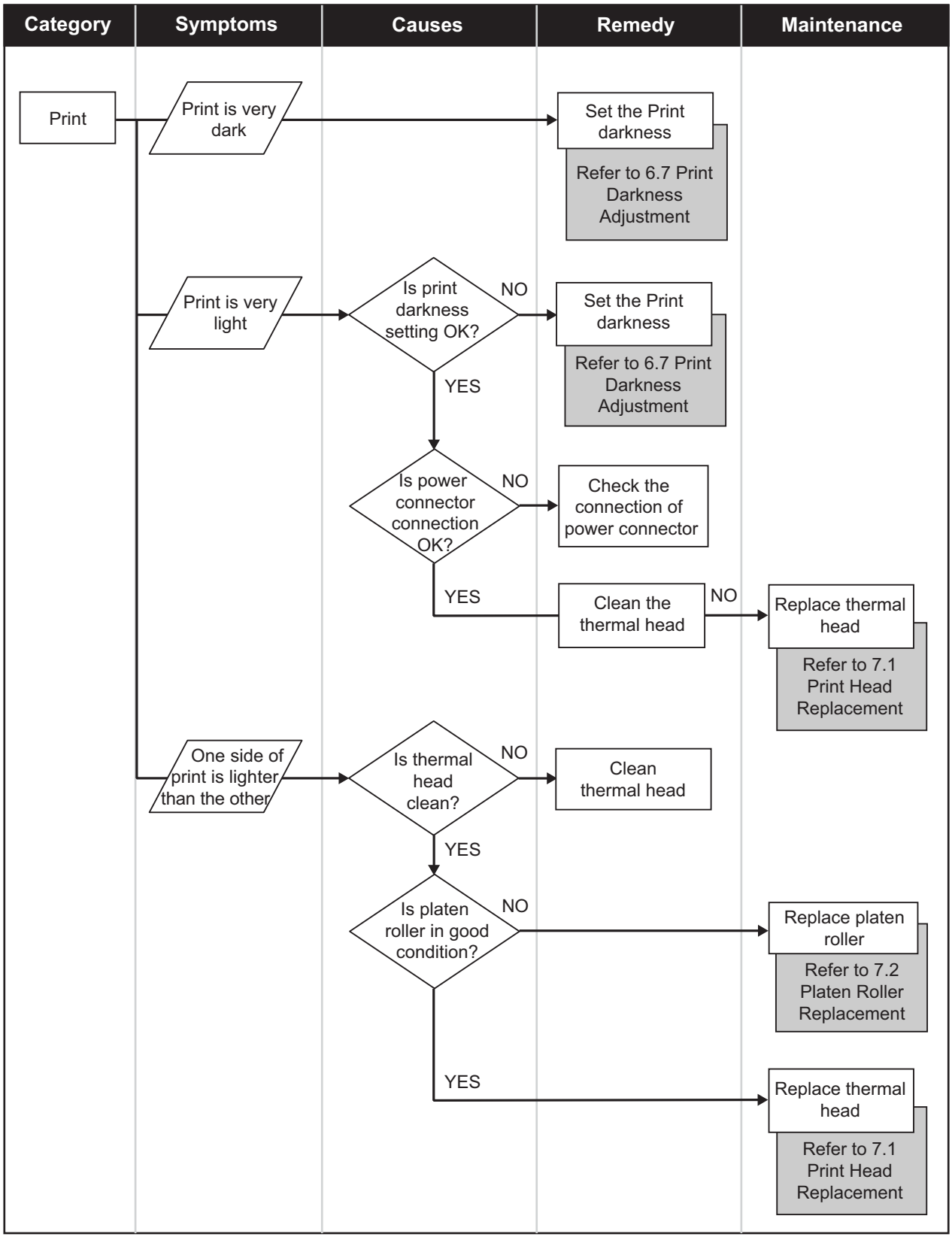
5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.3 Print Problems



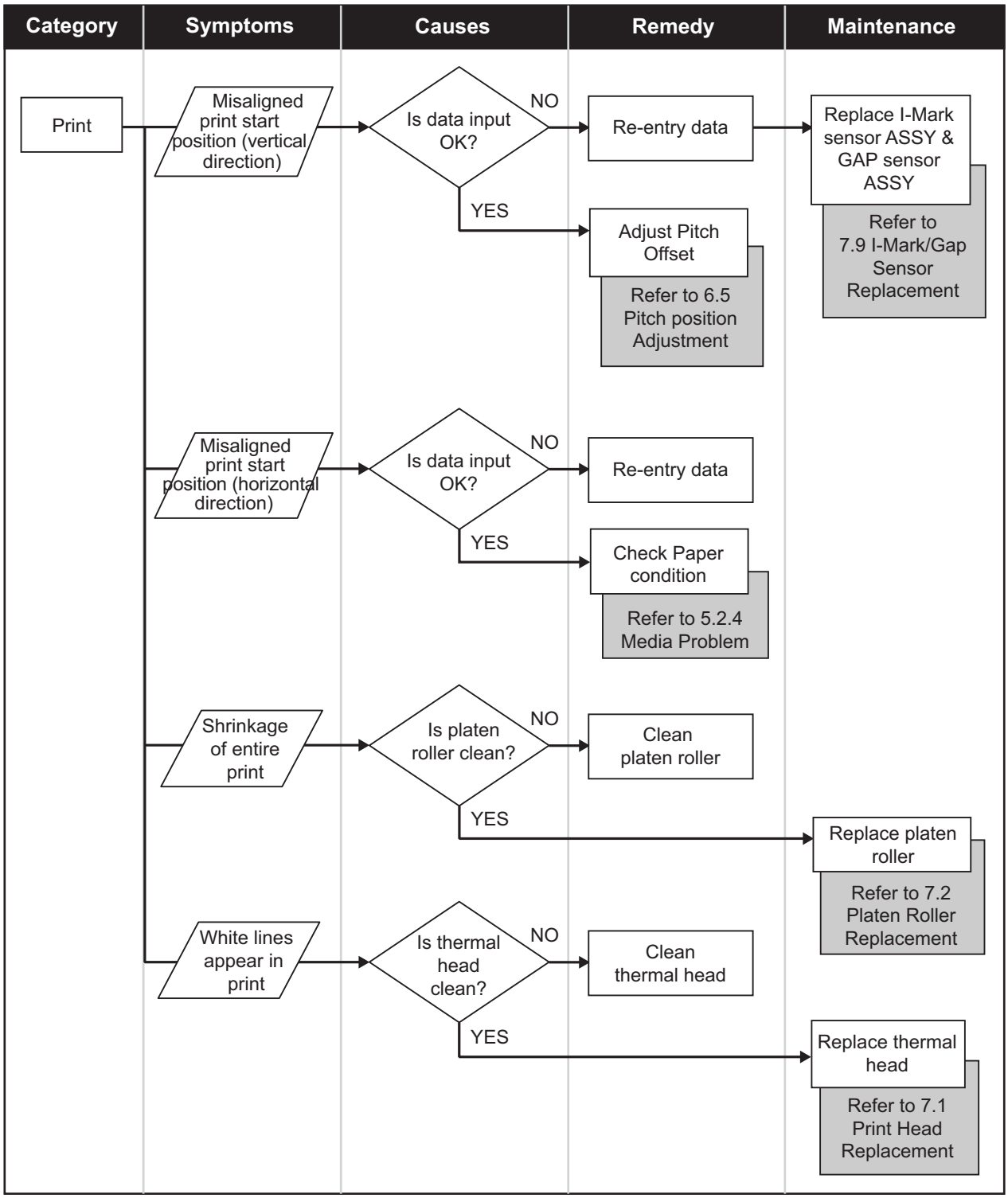
5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.3 Print Problems (cont'd)



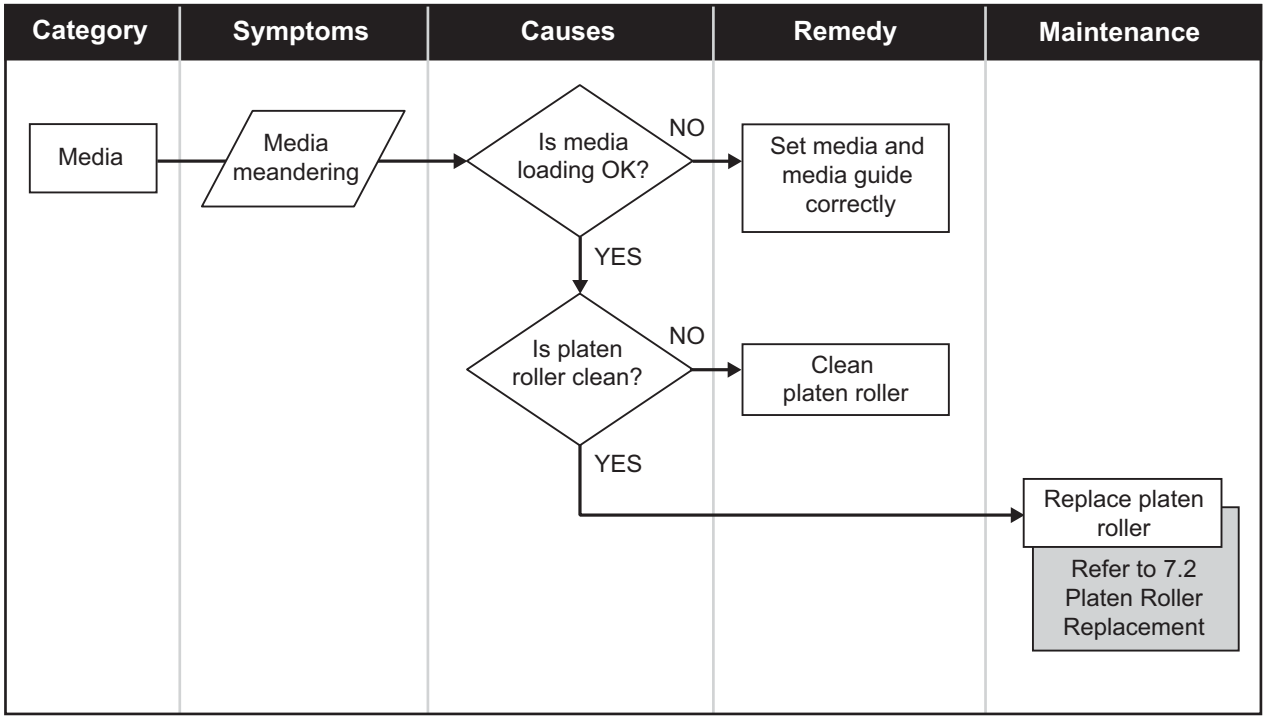
5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.3 Print Problems (cont'd)

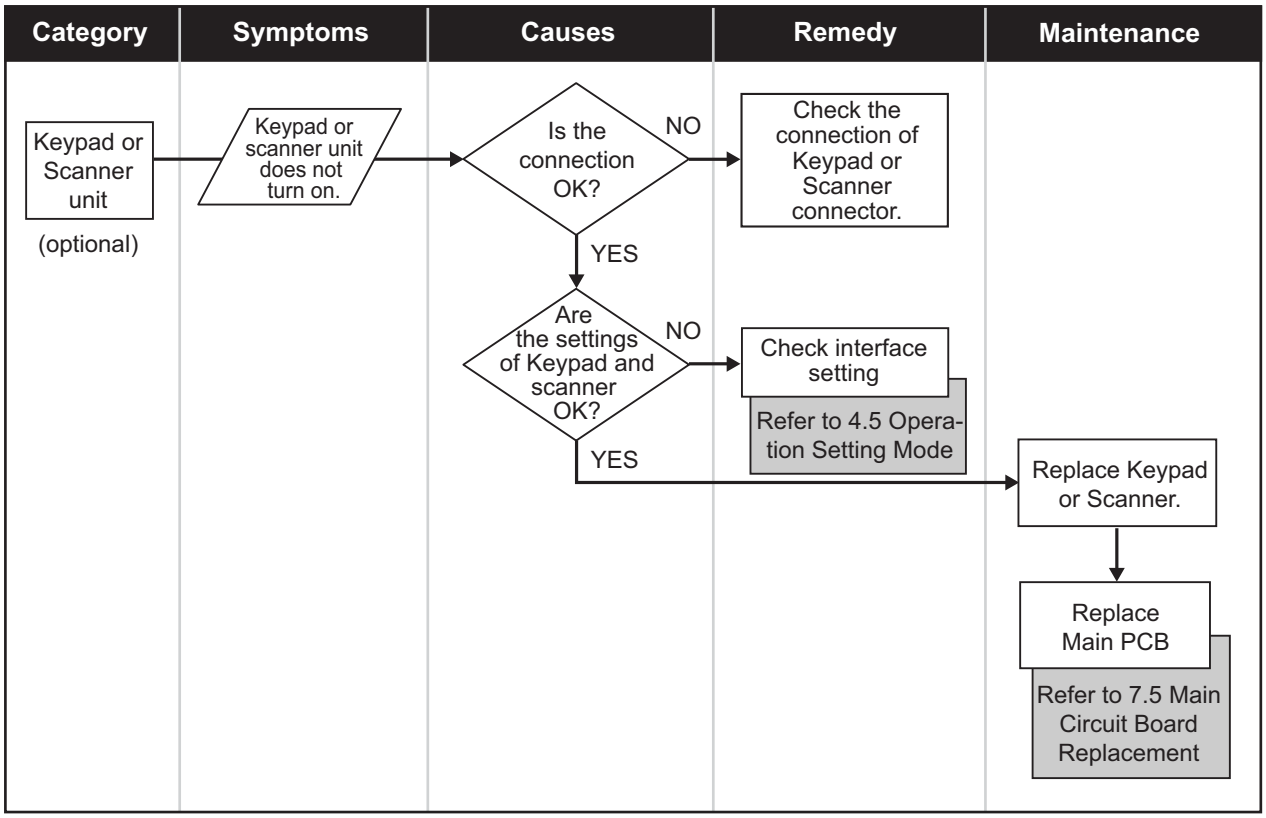


5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.4 Media Problem

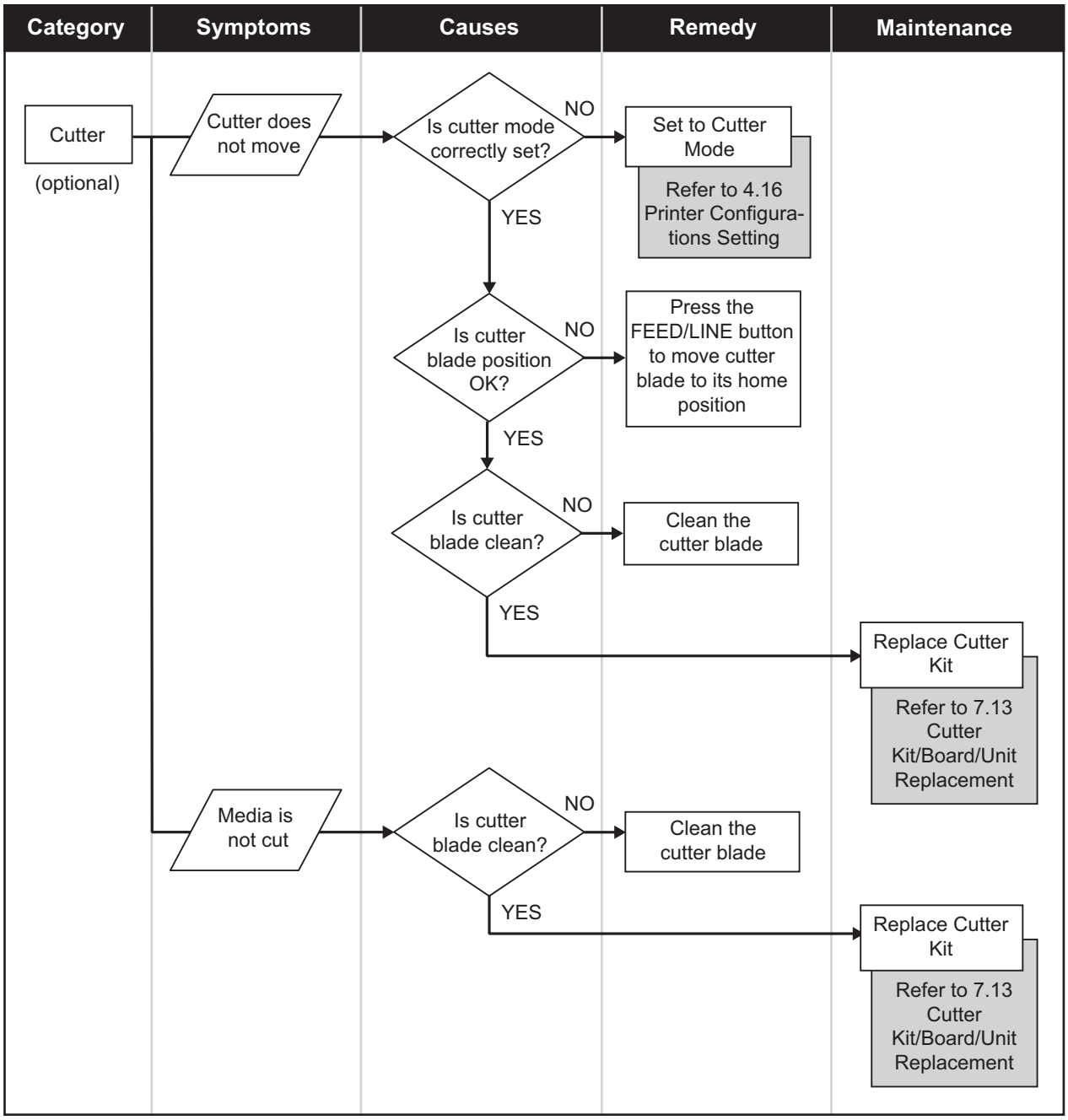


5.2.5 Keypad or Scanner Unit Problem (Optional)



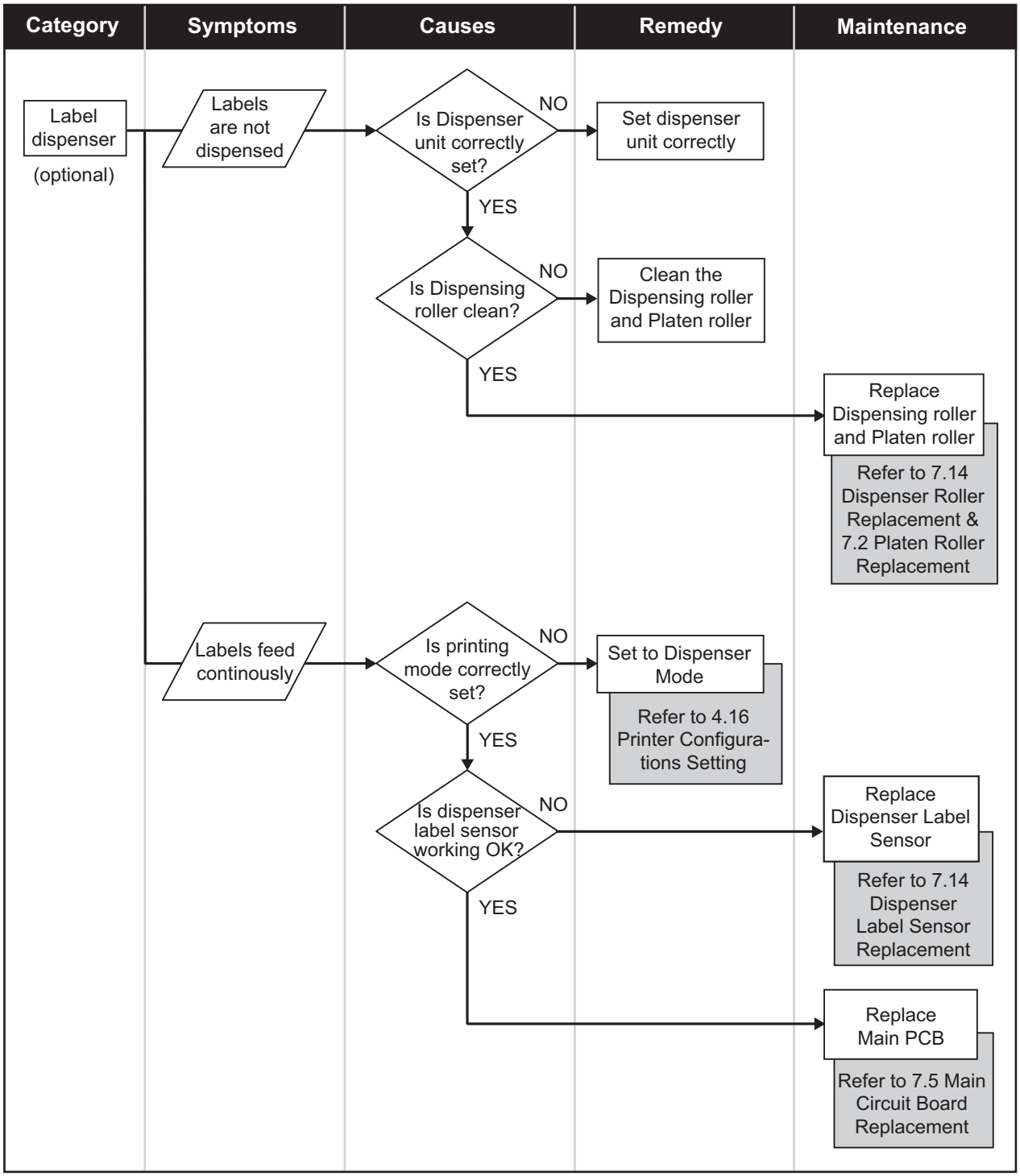
5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.6 Cutter Problem (optional)



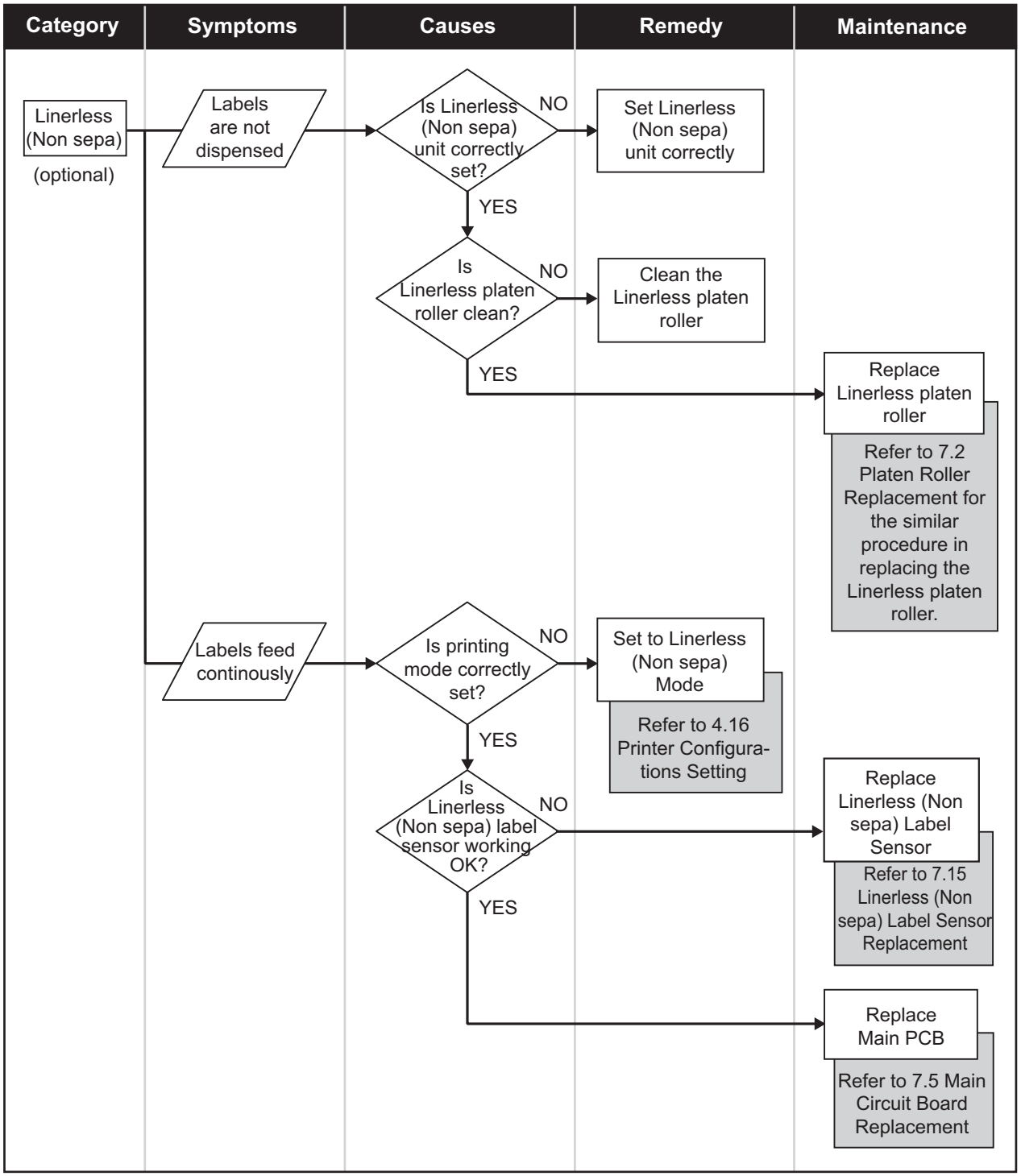
5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.7 Label Dispenser Problem (optional)



5.2 TROUBLESHOOTING FLOWCHART (cont'd)

5.2.8 Linerless (Non Sepa) Problem (Optional)



5.3 INTERFACE TROUBLESHOOTING

This chapter provides a checklist for the various interface types. Locate the checklist relative to the interface used and perform each of the troubleshooting tasks until the problem has been isolated.

UNIVERSAL SERIAL BUS (USB) INTERFACE

If nothing prints during a test print, verify the device drivers have been successively installed by performing the following:

CHK	TROUBLESHOOTING STEP
	Click on Start, Settings, and then Control Panel.
	Click on System within the new window.
	Click on the Device Manager tab.
	Ensure that the View Device By Type is checked.
	Scroll to SATO-USB Device and ensure that errors do not exist. Reinstall as required.
	Reboot the PC and the printer.

RS232 SERIAL INTERFACE

CHK	TROUBLESHOOTING STEP
	Ensure the correct interface module is correctly installed. Run self-test to verify.
	Ensure the serial cable (Null Modem) meets specifications and is correctly connected at each end.
	Ensure the serial cable is not defective.
	Ensure the communication parameters for the baud rate, parity, data bits and stop bits are consistent with those being sent from the host computer.
	Ensure the printer is receiving information from the computer using the Receive Buffer Hex Dump mode. Refer to that procedure within this manual for instructions. The command stream should be continuous and possess 0Dhex and/or 0Ahex (carriage return and line feed) characters throughout. However, there should not be either located between the start (<ESC>A) and the stop (<ESC>Z) commands.
	Try another port to isolate the problem.
	Replace the main circuit board if determined to be the problem.

LAN ETHERNET INTERFACE

CHK	TROUBLESHOOTING STEP
	Ensure the interface has been correctly configured. Wait two minutes and run self-test to verify. If a test label does not print, there may be a hardware problem.
	Ensure the cable and its ports are not defective.
	Ensure that a faulty print server or other protocol related scenarios are not creating a queue setup issue. Systematically perform checks and tests to isolate the cause.
	If using TCP/IP, ensure that a valid IP address is specified and that all parameters are correct (subnet mask, gateway, etc.). Attempt to PING the IP address assigned to the network interface.
	If using a repeater or hub, ensure the SQE is turned off. Also ensure the repeater port is not defective by trying the print server on another port.
	Install the IPX/SPX protocol on a workstation to determine if the network device can be discovered via the MAC address. If able, configure the appropriate protocols and retest connectivity.
	Use a crossover cable to isolate the printer from the network by connecting from the interface and workstation. Verify that the parameters match on each. Test connectivity.

5.3 INTERFACE TROUBLESHOOTING (Cont'd)

PARALLEL INTERFACE	
CHK	**TROUBLESHOOTING STEP**
	Ensure the interface module is correctly installed. Run self-test to verify.
	Ensure the printer cable is connected to the appropriate LPT port on the host computer. If using a Windows printer driver, ensure the correct port is selected.
	Ensure a IEEE1284 printer cable is being used.
	Ensure the host's peripheral settings are set to ECP for faster throughput. Refer to the computer manufacturer's documentation for details.
	Ensure the printer is receiving information from the computer using the Receive Buffer Hex Dump mode. Refer to that procedure within this manual for instructions. The command stream should be continuous and possess 0Dhex and/or 0Ahex (carriage return and line feed) characters throughout. However, there should not be either located between the start (<ESC>A) and the stop (<ESC>Z) commands.
	Try another port to isolate the problem.
	Replace the main circuit board if determined to be the problem.

5.4 TEST PRINT TROUBLESHOOTING

This chapter provides instruction on special printing to identify and resolve specific print problems.

5.4.1 Hex Dump

Allows the operator to determine if there were problems in the downloading of data. The contents of the print buffer can be examined using the Hex Dump Mode. In the left column, each line of data received is numbered. The center column provides the data in hexadecimal format. And in the right column, the same data are provided in the ASC ll format. Refer to **Section 4.9 HEX Dump Mode** for more details to perform this activity.

5.4.2 Test label printing

Allows the operator to identify specific problems regarding mechanical performance and setup. The test label is designed to assist in the identification of print problems. Refer to **Section 4.3 User Test Print Mode** for more details to perform this activity.

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6

CHECKS AND ADJUSTMENT PROCEDURES

This section provides instructions for electrical and mechanical adjustments to the printer. Regular maintenance in making adjustments to reset the printer to factory specifications will ensure optimum performance of your printer.

The Adjustment Procedure describe in this section are as follows.

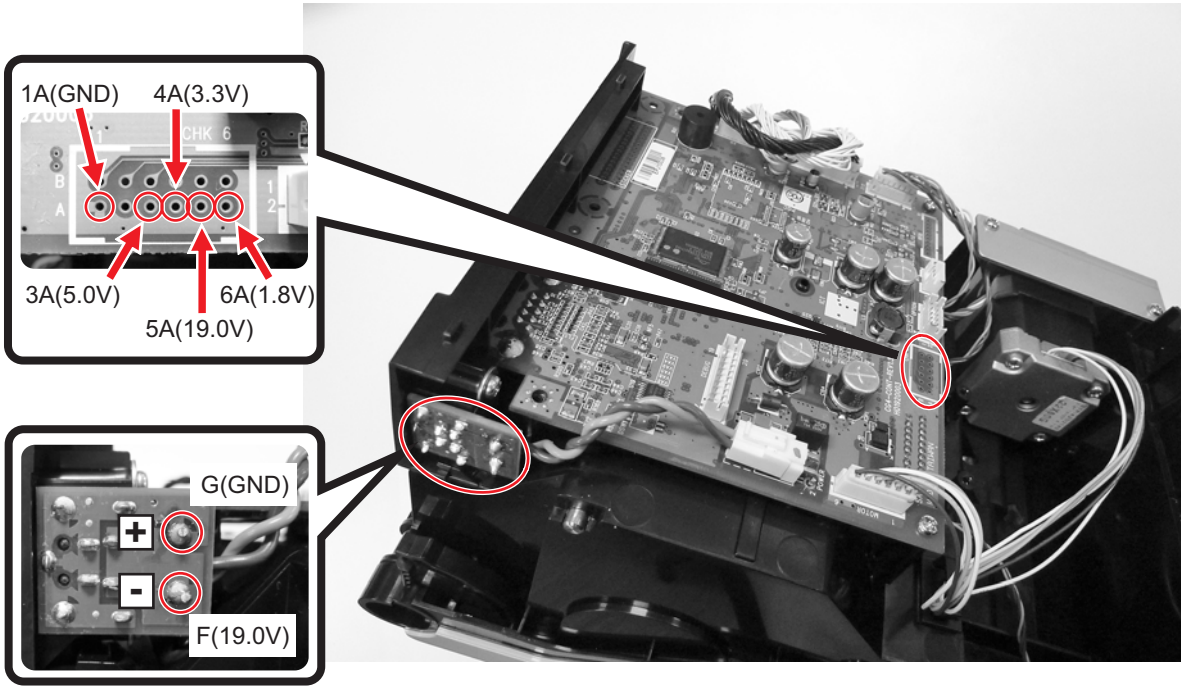
- 6.1 Checking the Power Supply
- 6.2 Automatic Adjustment of I-Mark and GAP Sensor Outputs
- 6.3 Sensor checks
- 6.4 Ribbon Tension Adjustment (For CG408TT, CG412TT only)
- 6.5 Pitch position Adjustment
- 6.6 Offset position Adjustment
- 6.7 Print Darkness Adjustment

6.1 CHECKING THE POWER SUPPLY

This checking procedure enables checking various direct current voltages of the **MAIN Printed Circuit Board** (**PCB**). These checking activities require the use of a multimeter.

1. Switch off the printer.
2. Remove the **Bottom Housing Cover** as explained in **Section 7.3 Removal of the Bottom Housing cover**.
3. Set the multimeter to Direct Current Voltage mode.
4. Turn the printer On.
5. Keep placing the [-] probe of the multimeter at the **1A(GND)** test point on the **MAIN PCB** for the following measurement.
6. Place [+] probe at **Test Point 5A**, and then measure at +19.0 V.
7. Place [+] probe at **Test Point 3A**, and then measure at +5.0 V.
8. Place [+] probe at **Test Point 4A**, and then measure at +3.3 V.
9. Place [+] probe at **Test Point 6A**, and then measure at +1.8 V.
10. Turn the printer off.

Table of normal performance values:	
+1.8 V	+1.7 V to +1.9 V (Test Point 6A)
+3.3 V	+3.1 V to +3.5 V (Test Point 4A)
+5.0 V	+4.8 V to +5.2 V (Test Point 3A)
+19.0 V	+18.0 V to +20.0 V (Test Point 5A)



6.1 CHECKING THE POWER SUPPLY (cont'd)

Diagnosis and Remedy:

If the measurement at **Test Point 5A** could not meet the +19.0 V criteria, turn off the printer and remove the power cable from the connector. Then, connect the probe to **Point F [+]** and **Point G [-]** on the DC board to measure the voltage of power source itself.

- When the power source itself still does not meet the +19.0 V criteria, replace the power adapter.
- When the power source itself complies with the specified value, replace the **MAIN PCB**. Please refer to **Section 7.5 Main Circuit Board Replacement** in this manual for instructions on replacement.

6.2 AUTOMATIC ADJUSTMENT OF I-MARK AND GAP SENSOR OUTPUTS

The I-Mark sensor adjustment regulates reflecting ability for media referencing and the GAP sensor adjustment regulates penetrating ability for media referencing.

The CG4 Series printer features an automatic adjustment of I-Mark and GAP sensor outputs for optimum performance. This feature can be activated in the Factory Adjustment mode. Please refer to **Section 4.13 Factory Adjustment Mode** for detailed procedures.

Diagnosis and Remedy:

From the third print-out of the Test printing, check the sensor level. The sensor output level for optimum performance is as follows.

Sensor	Sensor output level
I-Mark	(MIN) 1.5V or below. The difference between (MAX) and (MIN) must be 1.0V or more.
Gap	(MIN) 1.5V or below. The difference between (MAX) and (MIN) must be 1.0V or more.

If the I-Mark or GAP sensor does not perform correctly, even after the adjustment of I-Mark and GAP sensor automatically, replace the sensor board as describe in **Section 7.9 I-Mark/Gap Sensor Replacement**.

6.3 SENSOR CHECKS

6.3.1 Ribbon End Sensor Check

(Only for CG408 TT and CG412 TT Thermal transfer printer)

1. Press **POWER** button to turn on the printer.

2. Make sure the ribbon end error occurs when you press the **FEED/LINE** button while no ribbon is loaded. **ERROR** indicator should display red.

3. If no error is indicated for above specified operations, check the connector connection. If there is nothing wrong with the connection, the sensor needs to be replaced.
Refer to **Section 7.10 Ribbon End Sensor Replacement** of this manual for Ribbon Sensor Replacement instructions.

6.3 SENSOR CHECKS (cont'd)

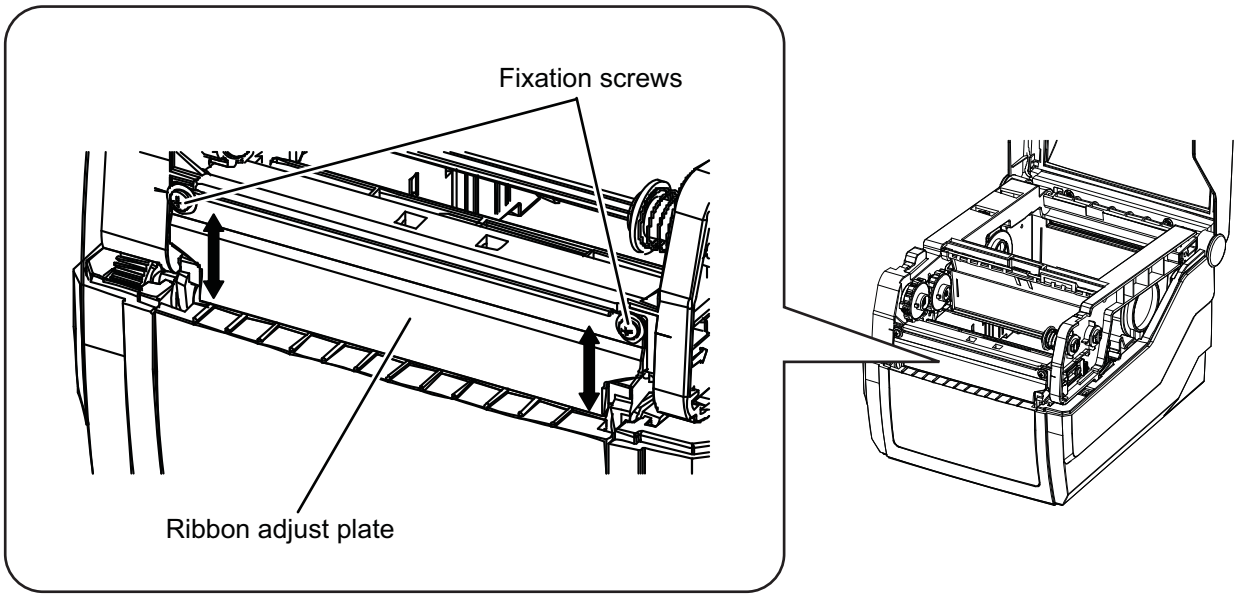
6.3.2 Top Cover Open Sensor Check

1. Press **POWER** button to turn on the printer.
2. Lift the **Top Cover** to generate a Top Cover open error, the **ERROR** indicator displayed red.
3. If the sensor is faulty, refer to **Section 7.7 Top Cover Open Sensor Replacement** of this manual for replacement instructions.

6.4 RIBBON TENSION ADJUSTMENT (FOR CG408TT, CG412TT ONLY)

This adjustment is performed to remove ribbon wrinkles and/or ribbon skewing.

1. Open the **Top cover** of the printer.
2. Pull the **lever** on the middle of the **ribbon unit** downward to pull out the **ribbon unit**.
3. Using a Phillips screwdriver (equivalent to JIS No.2), loosen the **fixation screws** of the **ribbon adjust plate** located anterior to the **head assembly**.
4. Move the **ribbon adjust plate** up and down to adjust ribbon tension. Tighten the **fixation screws**.
5. Do not adjust the **plate** too drastically as this may cause undue tension during ribbon winding.
6. Load the media and print a User Test print to check the printing.
   Refer to **Section 4.3 User Test Print Mode** or send the test print command (<TP>,2) to execute User test print.
   If necessary, repeat the above procedures to achieve optimum alignment.



6.5 PITCH POSITION ADJUSTMENT

The label Pitch is the distance from the leading edge (the edge that comes out of the printer first) of a label and the leading edge of the next label.
The leading edge position of the label can be adjusted relative to the print head. Therefore, the position to start printing will base on this setting. By sending command to the printer, this position can be adjusted within the range of ±99dots.

1. Prepare the printer to be ready for print out.
Ensure the required media are loaded and the printer is in Online mode.

2. Send the label pitch offset command to adjust the pitch position.
Command: <PC>20,**b**
b: Vertical pitch offset in dots (-99 to +99)
A positive value moves the leading edge of the label forward (away from the print head) while negative value moves the leading edge of the label back to the mechanism.

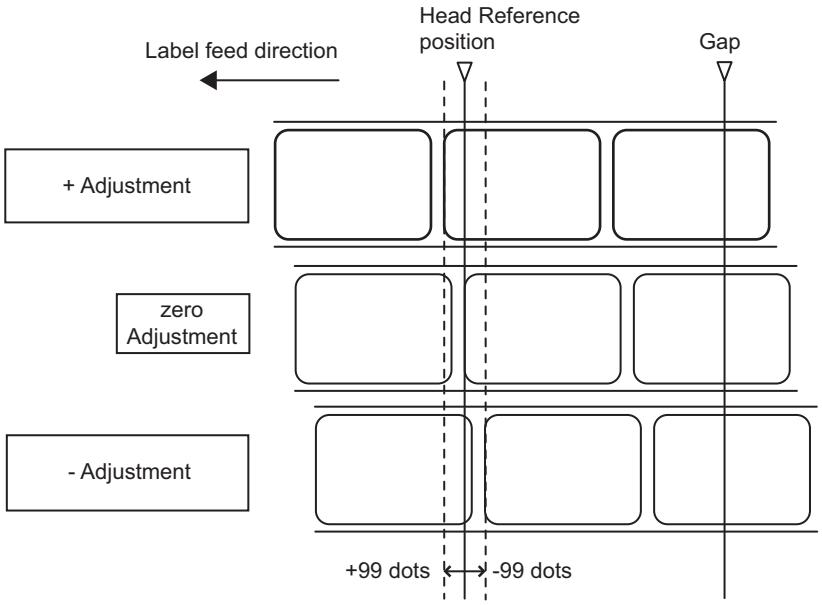
Example: To set the vertical pitch offset with the leading edge of the label move forward 8 dots.
<A>
<PC>20,+8
<Z>

3. Print a User Test print to check the print start position.
Refer to **Section 4.3 User Test Print Mode** or send the test print command (<TP>,2) to execute User test print.

4. If the print start position does not meet the criteria, repeat from step 2 above.

.

Adjustment of Pitch setting



6.6 OFFSET POSITION ADJUSTMENT

This setting adjusts the option (Tear off, Cutter, Dispenser) stop position after a print out.
By sending command to the printer, the stop position can be adjusted within the range of ±99 dots.

1. Prepare the printer to be ready for print out.
Ensure the required media are loaded and the printer is in Online mode.

2. Send the appropriate command to adjust the tear off, cut or dispense position accordingly as follows.
Commands:
- ***Tear off position offset*** command is <PC>21,**b**
- ***Cut position offset*** command is <PC>22,**b**
- ***Dispense position offset*** command is <PC>23,**b**

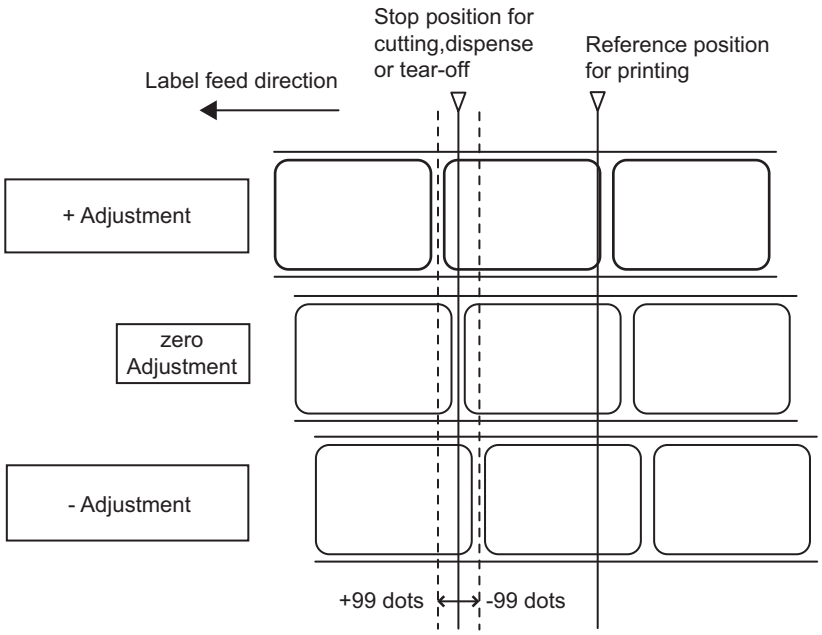
b: Vertical offset position in dots (-99 to +99)
A positive value moves the offset position of the label forward (away from the print head) while negative value moves the offset position of the label back to the mechanism.

Example: To set the Cut position offset with the cutting edge of the label move forward 8 dots.
<A>
<PC>22,+8
<Z>

3. Print a User Test print to check the offset position.
Refer to **Section 4.3 User Test Print Mode** or send the test print command (<TP>,2) to execute User test print.

4. If the print start position does not meet the criteria, repeat from step 2 above.

Adjustment of Offset setting



In addition to the above setting, the Offset position can also be adjusted by using SATO Utilities Tool application or by sending command <PO> from the host.

6.7 PRINT DARKNESS ADJUSTMENT

This feature allows the print darkness to be adjusted, thus affecting the quality and scannability of printed content. This adjustment must be made through host to printer interface connection, by sending command. The print darkness can be adjusted within the range of 1 to 5.

1. Prepare the printer to be ready for print out.
   Ensure the required media are loaded and the printer is in Online mode.
2. Send the print darkness level command to adjust the print darkness.
   Command: <PC>9,**b**
   b: Print darkness level (1 to 5)

   Example: To set the print darkness to level 3.
   <A>
   <PC>9,3
   <Z>
3. Print a User Test print to check the print quality.
   Refer to **Section 4.3 User Test Print Mode** or send the test print command (<TP>,2) to execute User test print. Ensure that the print out text should not be smudged or blurred. Clean the thermal head and platen roller to optimize the print quality.
4. If the print quality remains poor after trying the above procedures, replace the thermal head or platen roller. Refer to **Section 7.1 Print Head Replacement** or **Section 7.2 Platen Roller Replacement**.

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7

REPLACEMENT PROCEDURES

This unit provides in-depth instruction on all primary component and assembly replacement, in addition to most secondary components. Be sure to observe all the precautions or warning notes.

The Replacement Procedure describe in this section are as follows.

- 7.1 Print Head Replacement
- 7.2 Platen Roller Replacement
- 7.3 Removal of the Bottom Housing cover
- 7.4 DC Power Terminal Board Replacement
- 7.5 Main Circuit Board Replacement
- 7.6 Operator Panel (KB) Board Replacement
- 7.7 Top Cover Open Sensor Replacement
- 7.8 Stepper Motor Replacement
- 7.9 I-Mark/Gap Sensor Replacement
- 7.10 Ribbon End Sensor Replacement
- 7.11 Torque Limiter (Supply Unit) Replacement
- 7.12 Torque Limiter (Ribbon Wind-up Unit) Replacement
- 7.13 Cutter Kit/ Board/Unit Replacement (Optional)
- 7.14 Dispenser Kit/ Roller/ Label Sensor Replacement (Optional)
- 7.15 Linerless (Non sepa) Label Sensor Replacement (Optional)
- 7.16 Real Time Clock Battery Replacement (Optional)

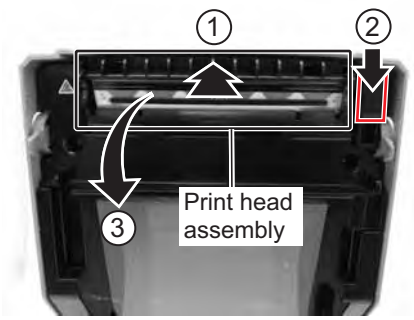
CAUTION:
EXCERCISE CARE WHEN INSTALLING THE PRINT HEAD TO ENSURE THAT ITS ELEMENTS ARE NOT DAMAGED DURING INSTALLATION.

7.1 PRINT HEAD REPLACEMENT

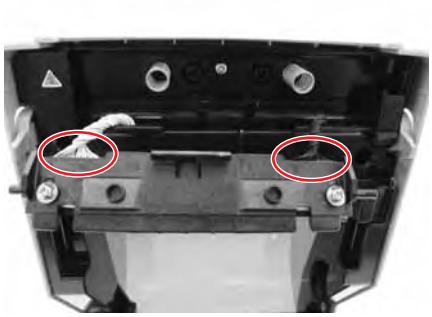
If the print head becomes damaged or worn, it can be easily removed and replaced without having to make critical adjustments.
Please wear protective gloves to avoid contaminating the sensitive print head surface. Before replacing the print head, check the head counter values by printing a test pattern.

7.1.1 Print Head Replacement (For CG408 DT and CG412 DT Direct Thermal printer)

1. Ensure the printer is turned off, and remove the power cable.
2. Lift the **Top Cover**.
3. While pressing and hold down the top portion of the **print head assembly** (see arrow ①), slide the **side tab** (②) downward to unlock the print head assembly. Shift the **print head assembly** to the right and pull the whole **print head assembly** downward.



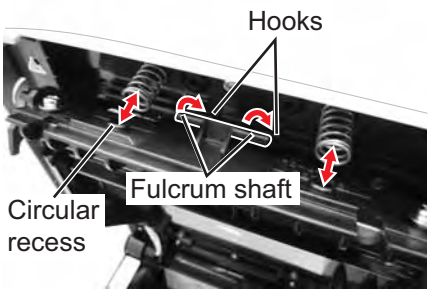
4. The **cable connectors** (circled) at the rear of the **print head** is now exposed. Pull the print head downward, then gently disconnect the defective **print head** from the cable connectors.
5. Carefully connect the **cable connectors** to a replacement **print head**. The **white cable** should be connected to the **left connector** while **black cable** should be connected to the **right connector**. The connectors are keyed so that they can only be inserted in the correct orientation.



CAUTION:
EXCERCISE CARE WHEN INSTALLING THE PRINT HEAD TO ENSURE THAT ITS ELEMENTS ARE NOT DAMAGED DURING INSTALLATION.

6. Insert the **left shaft** of the new **print head assembly** into the hole beside the triangular symbol on the left side of printer. (see circled area).‘

7. Align the two **circular recess** of the **print head bracket** to the two **springs** attached to the **top cover frame**. At the same time, fix the **fulcrum shaft** of the **print head bracket** to the **hooks**. While pressing the **print head**, slide the **side tab** upwards to lock the **print head assembly** in place.
8. Close the **Top Cover**.
9. Restore power, reload media, reset the head counter (refer to **Section 4.12 Factory Clear Mode**) and perform a test print to ensure that the **print head** is connected properly.



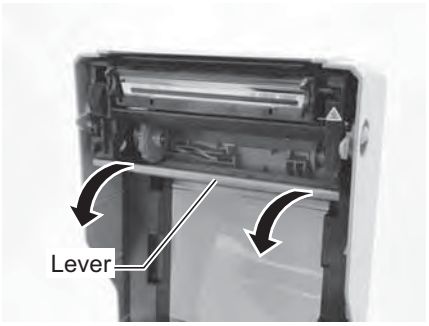
7.1 PRINT HEAD REPLACEMENT (cont'd)

7.1.2 Print Head Replacement (For CG408 TT and CG412 TT Thermal transfer printer)

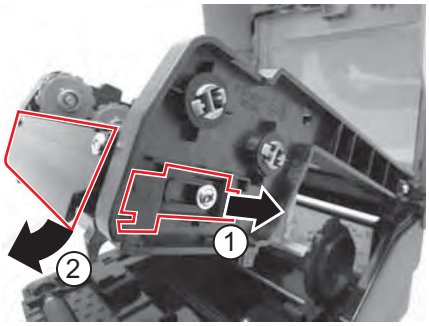
1. Ensure the printer is turned off, and remove the power cable.

2. Lift the **Top Cover**.

3. Pull the **lever** on the middle of the **ribbon unit** downward to pull out the **ribbon unit**. Then, simply let down the **ribbon unit**. There is a stopper midway through its movement range that will prevent the ribbon unit from snapping down.

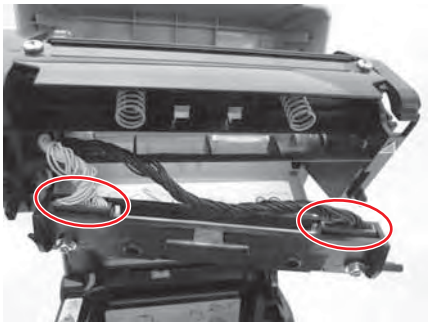


4. On the right side of the **ribbon unit**, slide the **print head release lever** (1) to unlock the **print head assembly**. Move the whole **print head assembly** downward.



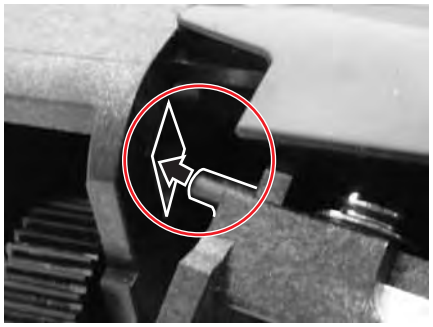
5. The **cable connectors** (circled) at the rear of the **print head** is now exposed. Pull the **print head** downward, then gently disconnect the defective **print head** from the cable connectors.

6. Carefully connect the **cable connectors** to a replacement **print head**. The **white cable** should be connected to the **left connector** while **black cable** should be connected to the **right connector**. The connectors are keyed so that they can only be inserted in the correct orientation.



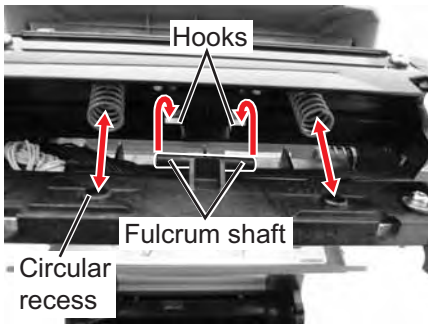
CAUTION:
EXCERCISE CARE WHEN INSTALLING THE PRINT HEAD TO ENSURE THAT ITS ELEMENTS ARE NOT DAMAGED DURING INSTALLATION.

7. Insert the **left shaft** of the new **print head assembly** into the hole on the left side of printer (see circled area).



7.1 PRINT HEAD REPLACEMENT (cont'd)

8. Align the two **circular recess** of the **print head bracket** to the two **springs** attached to the **top cover frame**. At the same time, fix the **fulcrum shaft** of the **print head bracket** to the **hooks**. While pressing the **print head**, slide the **print head release lever** to lock the **print head assembly** in place.
9. Restore power, reload media and ribbon, reset the head counter (refer to **Section 4.12 Factory Clear Mode**) and perform a test print to ensure that the **print head** is connected properly.



7.2 PLATEN ROLLER REPLACEMENT

The printer's platen roller is considered to be a high-wear component due to constant treading of the print media and ribbon stock against its contact surface. This constant contact will eventually wear grooves into the rubber material and negatively effect print output.

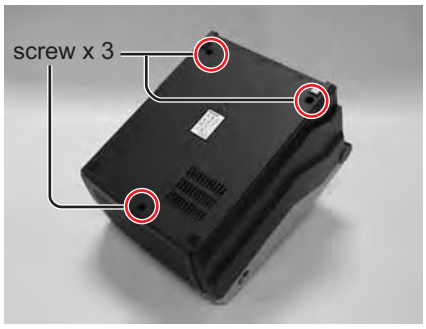
1. Make sure the printer is powered off and remove the power cable.
2. Lift the **Top Cover**.
3. Locate the two **platen bearings** on each side of the **platen roller**, and turn the handles in the direction as shown.

4. Lift up the defective **platen roller** assembly with the handles and replace it with a new one.
5. Follow the above steps, in reverse sequence, to reassemble the parts. Make sure that the **platen bearing** snaps back in position.
   Perform a label feed to ensure the **platen roller** is assembled correctly.

7.3 REMOVAL OF THE BOTTOM HOUSING COVER

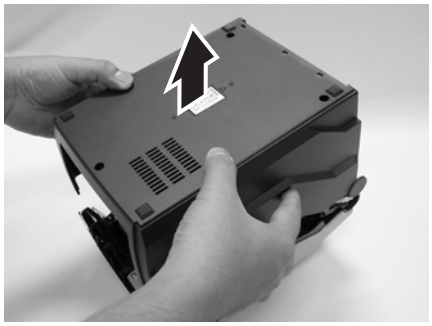
1. Make sure the printer is powered off and disconnect the power cable and interface cable.

2. From the **base** of the printer, remove three **screws** (circled) as shown.



> CAUTION:
> Ensure not to scrape the window portion when the printer is turned over.

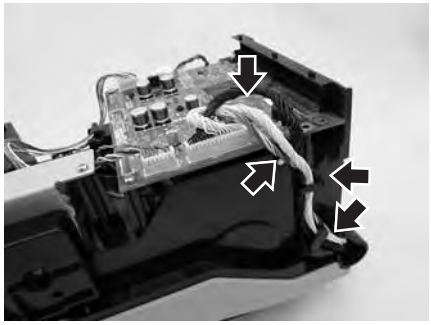
3. Remove the **Bottom Housing cover**.
Proceed the necessary procedures to perform your desired task on Installation, Adjustment or Replacement.

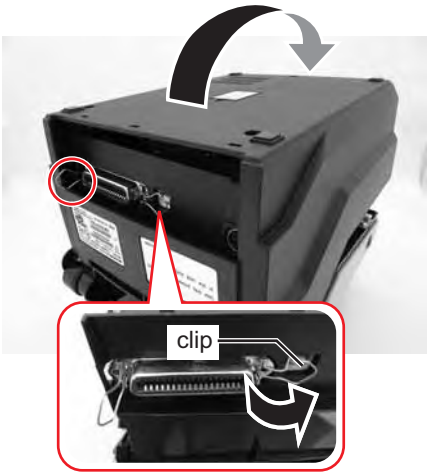


4. Follow the above steps in reverse sequence to reassemble the **Bottom Housing cover**.

Notes:

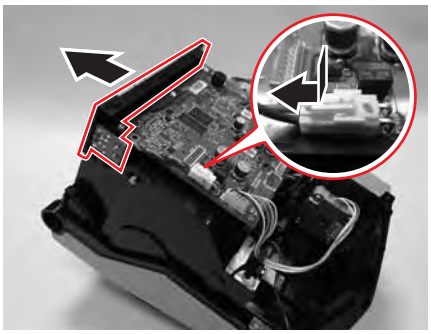
- Ensure the wiring route neatly as shown and arrange all the wiring to avoid from being pinched when fitting the **bottom housing cover**.
- When reassemble the **Bottom Housing cover** to the printer with **IEEE interface terminal**, flip one of the **clip** of the interface terminal as shown. Then fix the **Bottom Housing cover** while holding the other **clip**, pulling the **Bottom Housing cover** forward and downward.



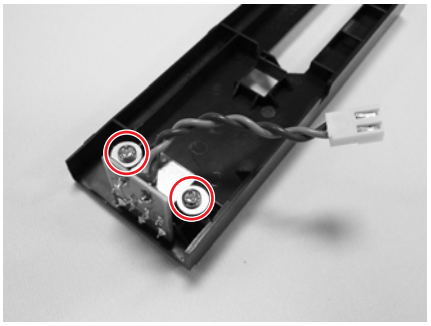


7.4 DC POWER TERMINAL BOARD REPLACEMENT

1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Press to release the **catch** of the **Power cable connector** and disconnect the connector from the **MAIN Printed Circuit Board (PCB)** as shown.
3. Remove the **Interface Panel** from the rear of the printer.



4. Remove two set of **screws** and **washers** (circled) securing the **DC Power terminal Board** to the **Interface Panel** as shown.
5. Replace the new **DC Power terminal Board** and follow the above steps in reverse sequence, to reassemble the parts.



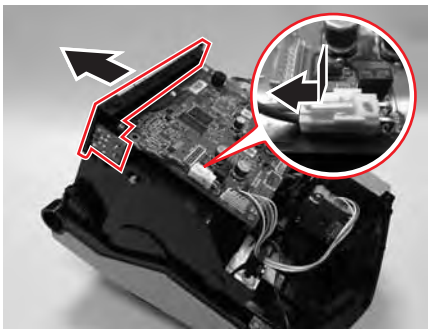
Notes:

- Align the **Interface Panel** to the center rear of printer.
- Ensure the cables are not pinch when fitting the **bottom housing cover**.

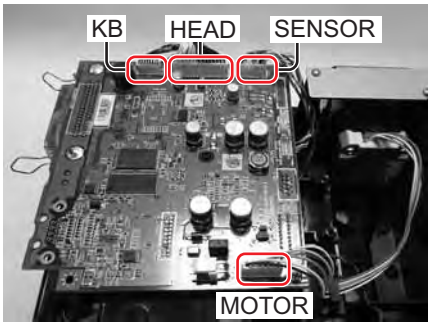
7.5 MAIN CIRCUIT BOARD REPLACEMENT

The main circuit board is the primary brain-center for all printer activities. Circuit boards generally have long lives due to the lack of moving parts. So if a circuit board becomes defective, it is usually due to a negative external condition. If it is determined that the circuit board has become defective, search the printer over for possible visual factors that may have led to the damage.

1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Press to release the **catch** of the **Power cable connector** and disconnect the connector from the **MAIN Printed Circuit Board (PCB)** as shown.
3. Remove the **Interface Panel** from the rear of the printer.

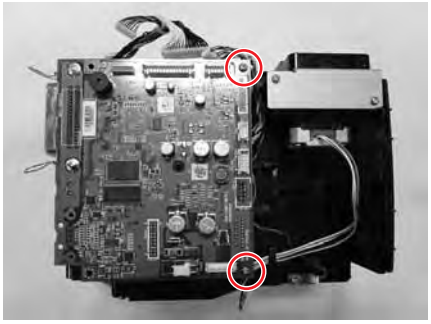


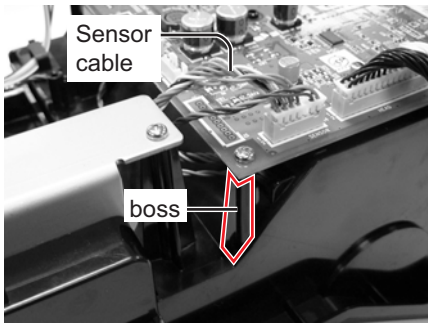
4. Disconnect connectors **MOTOR Cable Assy**, **SENSOR Cable Assy**, **HEAD Cable Assy** and **Operator Panel (KB) Cable Assy** on the **MAIN Printed Circuit Board (PCB)**.



5. Remove two **screws** (circled) securing the **MAIN Printed Circuit Board (PCB)** to the printer chassis as shown.
6. The **MAIN PCB** can now be removed and replaced.
7. Reconnect all the cables disconnected previously to the replacement board and arrange all the wiring to avoid from being pinched.
8. Secure the replacement board with two **screws** and follow the above step 1 to 4 in reverse sequence, to reassemble the parts.

   Note:
   Arrange the sensor cable through on the inner side of boss as shown.





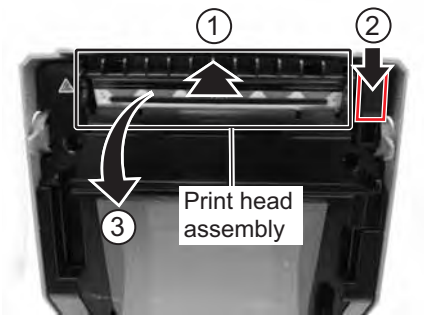
9. After the **MAIN PCB** is certified to be in working condition, perform All Clear function (refer to **Section 4.12 Factory Clear Mode**), and Sensor adjustment (refer to **Section 4.13 Factory Adjustment Mode**).

7.6 OPERATOR PANEL (KB) BOARD REPLACEMENT

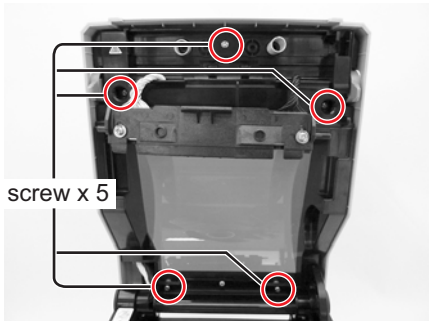
This circuit board provides the user interaction functionality via Operator buttons.

7.6.1 Operator Panel Board Replacement (For CG408 DT and CG412 DT Direct Thermal printer)

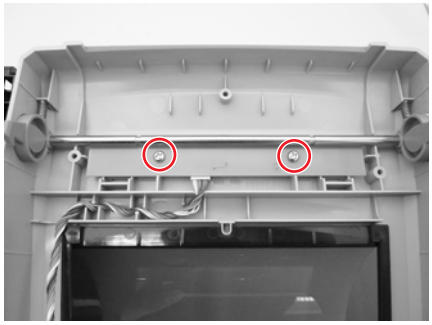
1. Ensure the printer is turned off, and remove the power cable.
2. Lift the **Top Cover**.
3. While pressing and hold down the top portion of the **print head assembly** (see arrow ①), slide the **side tab** (②) downward to unlock the print head assembly. Shift the **print head assembly** to the right and pull the whole **print head assembly** downward.
   Removing the **print head assembly** reveals the **screw** attaching to the top of the **cover frame**.



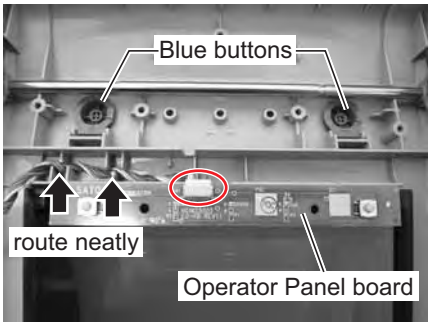
4. Remove five **screws** (circled) from the **frame** of the **Top Cover** and remove the **frame** from the **Top Cover**.



5. Remove the two **screws** (circled) securing the **Operator Panel (KB) board** to the underside of the **Top Cover**.



6. Disconnect the **cable connector** (circled) from the defective **Operator Panel (KB) board.**

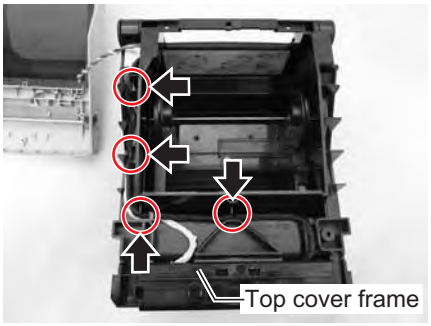


7.6 OPERATOR PANEL (KB) BOARD REPLACEMENT (cont'd)

7. Replace the new **Operator Panel (KB) board** and follow the above steps in reverse sequence, to reassemble the parts.

Notes:

- During replacement, ensure the two **blue buttons** were in the position where the tab sits in the groove.
- Ensure the wiring route neatly as shown and arrange all the wiring to avoid from being pinched.

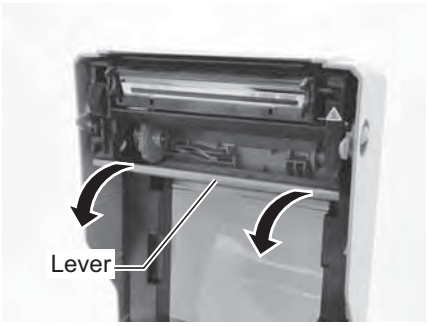


7.6.2 Operator Panel Board Replacement (For CG408 TT and CG412 TT Thermal transfer printer)

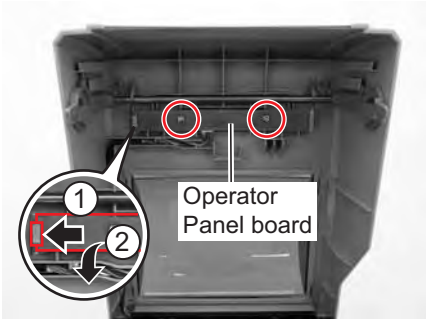
1. Ensure the printer is turned off, and remove the power cable.

2. Lift the **Top Cover**.

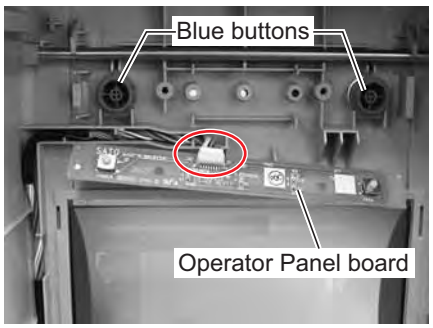
3. Pull the **lever** on the middle of the **ribbon unit** downward to pull out the **ribbon unit**. Then, simply let down the **ribbon unit**. There is a stopper midway through its movement range that will prevent the ribbon unit from snapping down.



4. Remove the two **screws** (circled) securing the **Operator Panel (KB) board** to the underside of the **Top Cover**. Then push the left **catch** of the **Top cover** in the direction of the arrow as shown to detach the **Operator Panel (KB) board.**



5. Disconnect the **cable connector** (circled) from the defective **Operator Panel (KB) board**.

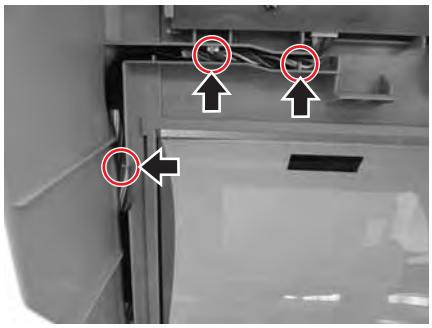


7.6 OPERATOR PANEL (KB) BOARD REPLACEMENT (cont'd)

6. Replace the new **Operator Panel (KB) board** and follow the above steps in reverse sequence, to reassemble the parts.

Notes:

- During replacement, ensure the two **blue buttons** were in the position where the tab sits in the groove.
- Ensure the wiring route neatly as shown and arrange all the wiring to avoid from being pinched.



7.7 TOP COVER OPEN SENSOR REPLACEMENT

1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.

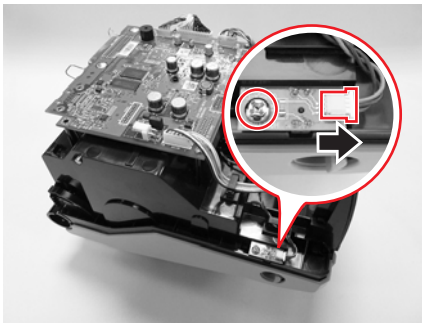
2. Locate the **Cover sensor** as shown.

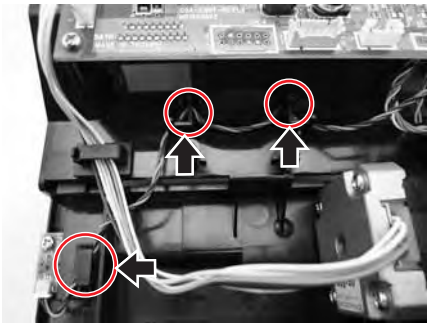
3. Remove the **screw** (circled) securing the **Cover sensor board** to the printer.

4. Disconnect the **cable connector** from the defective **Cover sensor board**.

5. Replace the new **Cover sensor board** and follow the above steps in reverse sequence, to reassemble the parts.

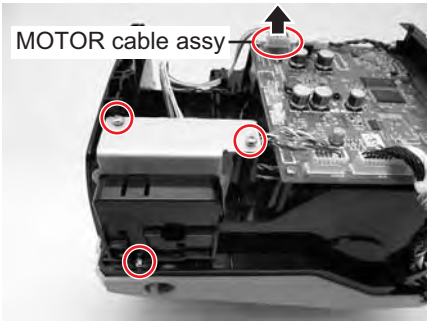
Note:
Ensure the wiring routes neatly as shown.



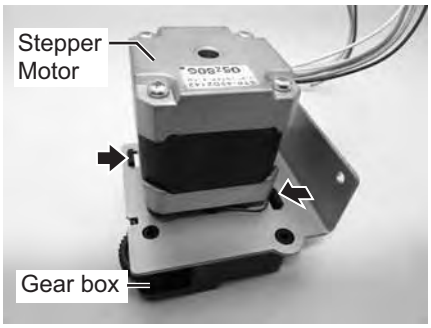


7.8 STEPPER MOTOR REPLACEMENT

1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Remove three **screws** (circled) securing the **Stepper motor assembly** to the printer.
3. Disconnect the **MOTOR cable assy** from the **MAIN PCB**.



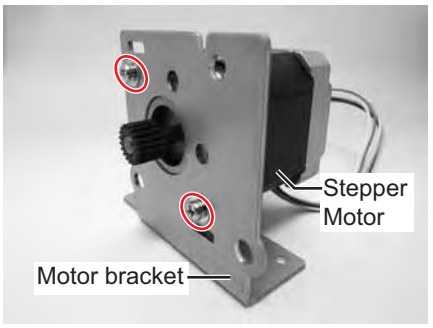
4. With the **gear box** positioned at the bottom, press the two **catches** to remove the **gear box** from the **Stepper motor assembly**.
   When removing the **gear box**, be careful not to lose the gears. If the gears have dropped off, place the gears to their position according to the print head resolutions.



Gear arrangement for 203dpi

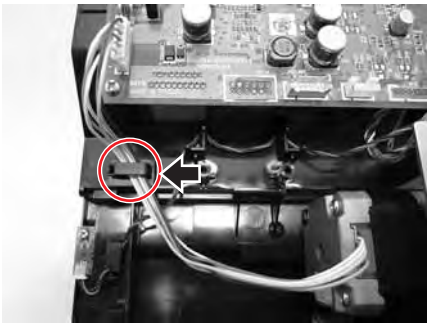
Gear arrangement for 305dpi

5. Remove two **screws** (circled) securing the **Stepper motor** to the **Motor bracket**.



6. Replace the new **Stepper motor** and follow the above steps in reverse sequence, to reassemble the parts.

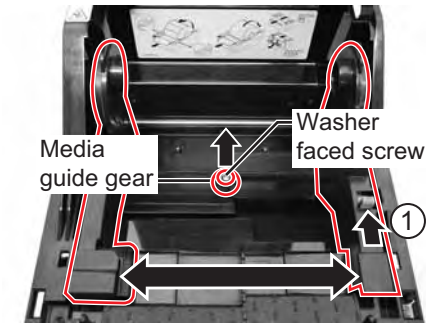
   Notes:
   - Position the Stepper motor assembly ensuring the gear interlock with the gear of the platen roller.
   - Ensure the wiring routes neatly as shown.



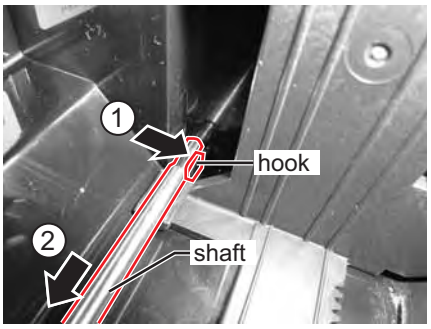
7.9 I-MARK/GAP SENSOR REPLACEMENT

The Gap sensor is of a transmit/ receive variety. The transmit and receive sensors are mounted separately on the left media guide.
The I-Mark/Gap sensor may need replacement if cleaning or adjustment of sensor sensitivity does not improve their functionality.

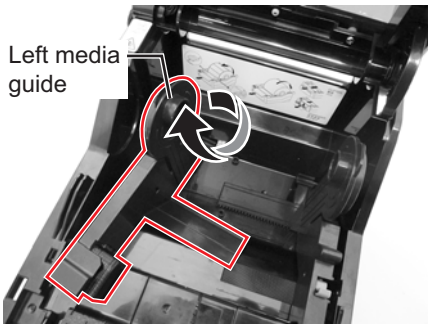
1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Lift the **Top Cover**.
3. Press the **Media guide slide lever** to adjust the **Media guides** to the maximum width.
4. Remove the **washer faced screw** and then the **Media guide gear** that are holding the **Media guides** in placed.



5. Push the **hook** on the bottom right of the **frame** slightly in the direction of the arrow to remove the shaft. Push in the **shaft** of the **Media guide** from the right side of the printer and pull out from the left.

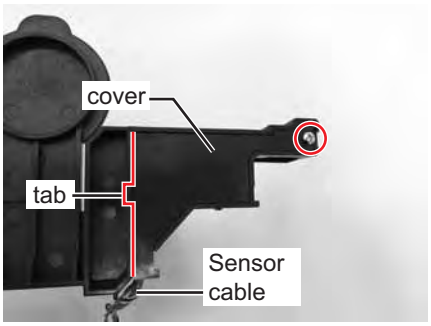


6. Lift up the **left Media guide** by tilting it as shown. Please be careful with the attached **Sensor cable** when removing the **Media guide**.



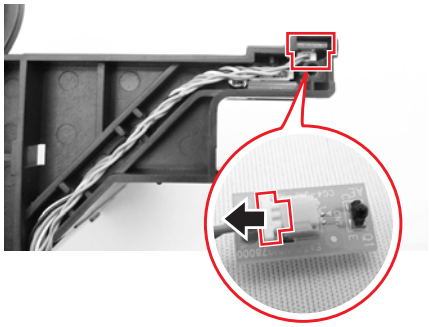
7. With the **Sensor cable** attaching to the **left Media guide**, remove the **screw** (circled) securing the **cover** of the **left Media guide**.

   Notes:
   - Avoid exert pulling force to the **sensor cable** while replacing the sensor boards.
   - Insert the **tab** of the **cover** first when assemble the **cover** back to the **left media guide**.

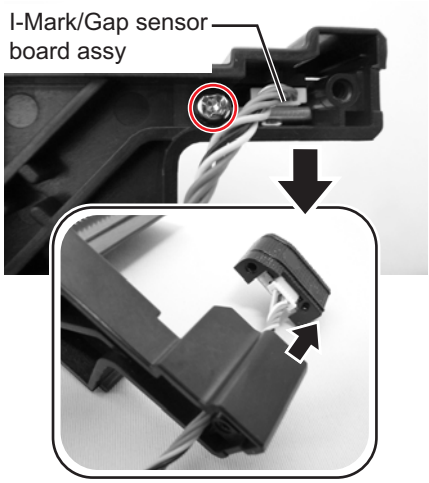


7.9 I-MARK/GAP SENSOR REPLACEMENT (cont'd)

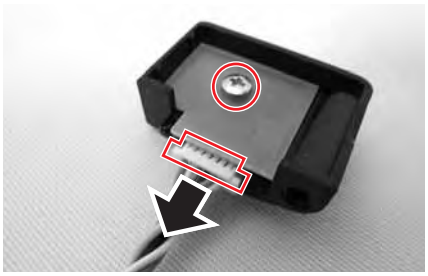
8. Remove the **Upper Gap sensor board** as indicated and disconnect the attached **cable connector**. Replace the new **Upper Gap sensor board**.



9. Remove the **screw** (circled) securing the **I-Mark/Gap sensor board assy** to the **left Media guide**.



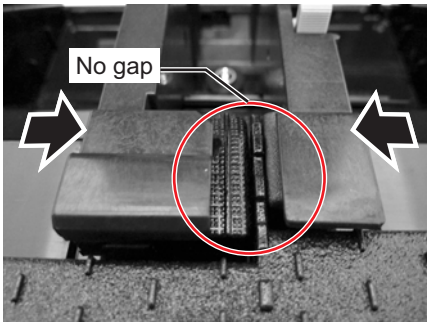
10. From the underside of the **I-Mark/Gap sensor board assy**, remove the **screw** (circled) securing the **sensor cover** to the **I-Mark/Gap sensor board.**



11. Disconnect the **cable connector** and replace the new **I-Mark/Gap sensor board** and follow the above steps in reverse sequence, to reassemble the parts.

Notes:

- When fixing the **Media guides** back to printer, place the **Media guides** separately on both sides with the maximum width. Then insert the shaft back in position, place the **Media guide gear** interlock with the **guides** and fix them in position with the **washer faced screw**.
- Ensure that there is no gap in between the **media guides** when the **media guides** are adjusted to minimum as shown.

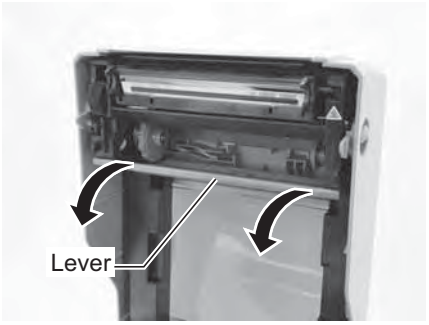


12. After replacement, perform I-Mark/Gap sensor adjustment. Refer to **Section 4.13 Factory Adjustment Mode**.

7.10 RIBBON END SENSOR REPLACEMENT

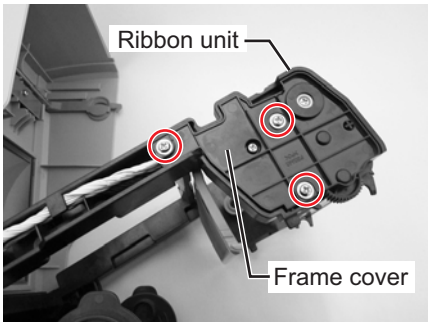
(Only for CG408 TT and CG412 TT Thermal transfer printer)

1. Ensure the printer is turned off, and remove the power cable.
2. Lift the **Top Cover**.
3. Pull the **lever** on the middle of the **ribbon unit** downward to pull out the **ribbon unit**. Then, simply let down the **ribbon unit**. There is a stopper midway through its movement range that will prevent the ribbon unit from snapping down.



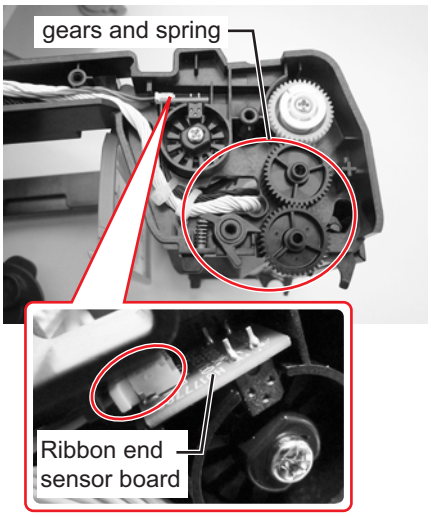
4. On the left of the **ribbon unit**, remove three **screws** (circled) securing the **Frame cover** of ribbon unit. Remove the **Frame cover**.

   Note:
   When the **Frame cover** is removed, be careful not to lose the gears or the attached spring.



5. Take out the defective **Ribbon end sensor board** and disconnect the **cable connector**.
6. Replace the new **Ribbon end sensor board** and follow the above steps in reverse sequence, to reassemble the parts.

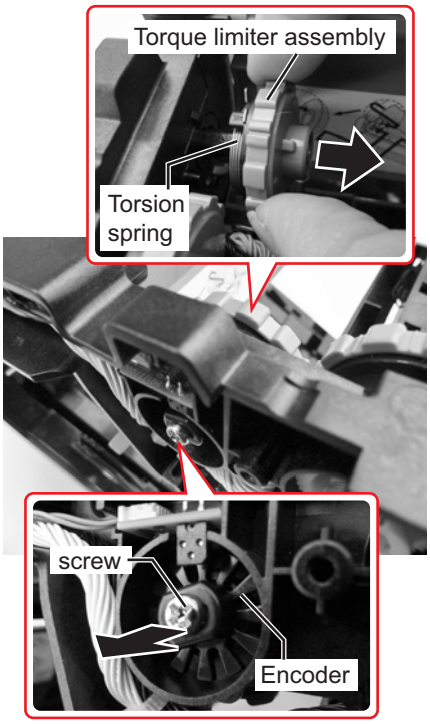
   Note:
   Place the **Ribbon end sensor** such that the **encoder** is in between the sensor.



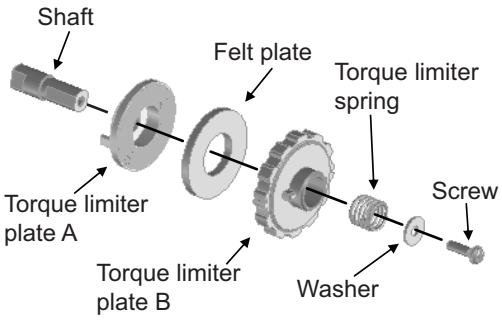
7.11 TORQUE LIMITER (SUPPLY UNIT) REPLACEMENT

(Only for CG408 TT and CG412 TT Thermal transfer printer)

1. Remove the **Frame cover** of the **Ribbon unit** as mentioned in **Section 7.10 Ribbon End Sensor Replacement** above. Follow step 1 to 4 to remove the **Frame cover**.
2. Remove the **screw** securing the **Encoder**, **Torsion spring** and the **Torque limiter assembly**. Remove these parts and set them aside.



3. Disassemble the **Torque limiter assembly** to replace the defective internal parts.
   Remove the **screw** and carefully take the parts apart. The **Torque limiter spring** and the **Felt plate** may need replacement.
4. After replacement, follow the above steps in reverse sequence, to reassemble the parts.



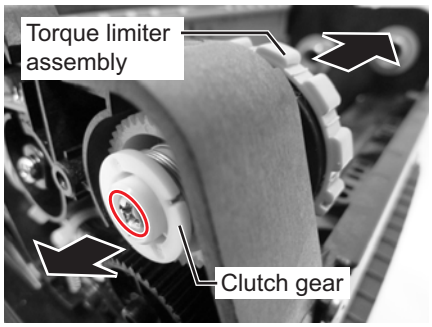
Notes:

- When reassemble the **Torque limiter assembly**, be careful on the sequence of the parts. Ensure the orientation of the **washer** that the shear-drooped side goes to the spring side.
- When reassemble the **Torque limiter assembly** to the **Ribbon unit frame**, attach the hook of the **Torsion spring** to the tab of **Torque limiter** and then slightly pull the other hook of the **Torsion spring** and attach to the tab of the **Ribbon unit frame**.

7.12 TORQUE LIMITER (RIBBON WIND-UP UNIT) REPLACEMENT

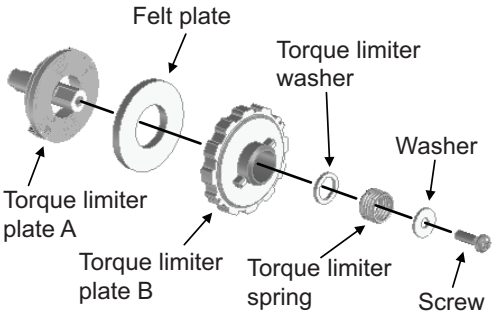
(Only for CG408 TT and CG412 TT Thermal transfer printer)

1. Remove the **Frame cover** of the **Ribbon unit** as mentioned in **Section 7.10 Ribbon End Sensor Replacement** above. Follow step 1 to 4 to remove the **Frame cover**.
2. Remove the **screw** (circled) securing the **Clutch gear** and the **Torque Limiter assembly**. Remove these parts and set aside.



3. Disassemble the **Torque Limiter assembly** to replace the defective internal parts.
   Remove the **screw** and carefully take the parts apart. The **Torque limiter spring** and the **Felt plate** may need replacement.
4. After replacement, follow the above steps in reverse sequence, to reassemble the parts.

   Note:
   When reassemble the **Torque limiter assembly**, be careful on the sequence of the parts. Ensure the orientation of the **washer** that the shear-drooped side goes to the spring side.

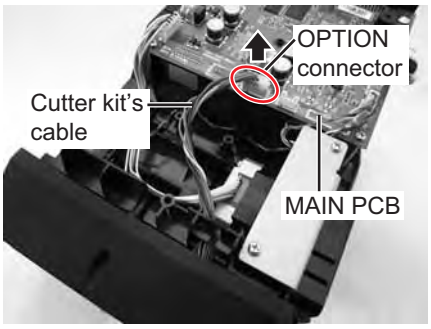


7.13 CUTTER KIT/ BOARD/UNIT REPLACEMENT (OPTIONAL)

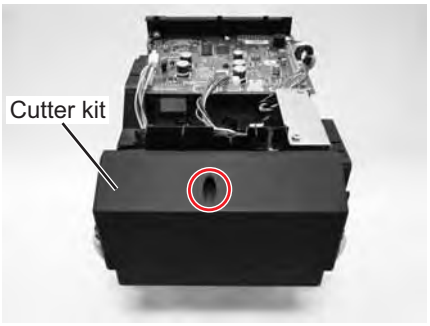
This section covers the basic mechanical procedures for replacement of the whole Cutter Kit or just the Cutter board or Cutter unit.
Before replacement, check the cutter counter by printing a Factory test print. Please refer to Section for details.

7.13.1 Cutter kit Replacement

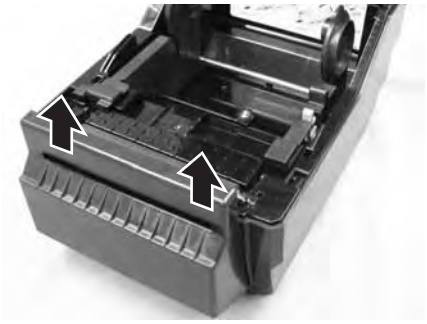
1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Disconnect the **Cutter kit's cable** from the **OPTION connector** on the **MAIN PCB**.



3. From the base of the **Cutter kit**, remove a **screw** (circled) as shown.



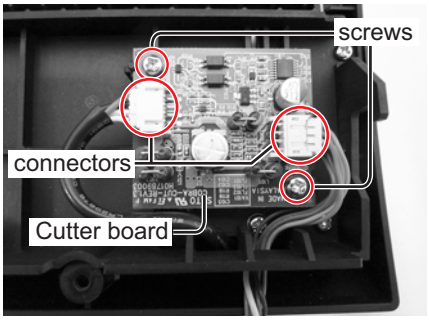
4. Turn over the printer in upright position, open the **Top cover** and remove the **Cutter kit** by lifting it upward.
5. Replace the new **Cutter kit** and follow the above steps in reverse sequence, to reassemble the parts.
   Continue the following steps if you required to replace the **Cutter board**.



> CAUTION:
> Ensure that no cables are pinched between parts when you are installing the **cutter kit** to the printer.

7.13.2 Cutter board Replacement

6. From the circuit board side of the **Cutter kit**, remove two **screws** (circled) securing the **Cutter board** to the **Cutter kit assembly** and disconnect the two **cable connectors** from the defective **Cutter board**.
7. Replace the new **Cutter board** and follow the above steps in reverse sequence, to reassemble the parts.
   Continue the following steps if you required to replace the **Cutter unit**.

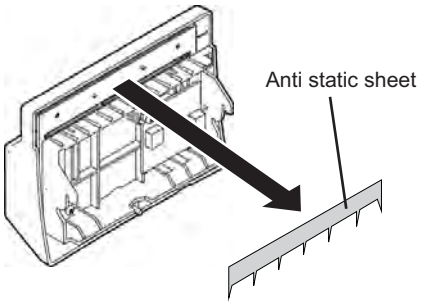


> CAUTION:
> Ensure that no cables are pinched between parts when you are installing the **cutter board** to the printer.

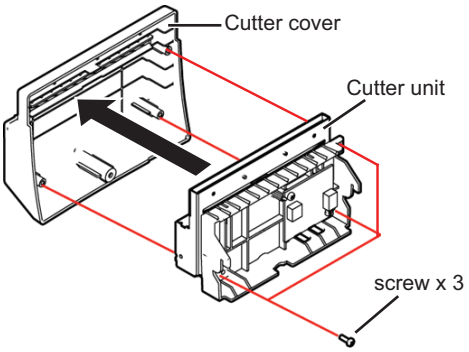
7.13 CUTTER KIT/ BOARD/UNIT REPLACEMENT (OPTIONAL) (cont'd)

7.13.3 Cutter unit Replacement

8. Peel off the **Anti static sheet** from the **Cutter unit** and put it aside for latter use.



9. Remove three **screws** to detach the **Cutter cover** from the **Cutter unit**.

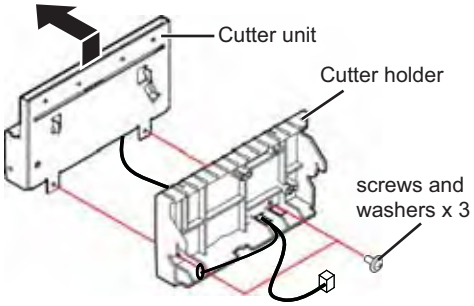


10. Remove two **screws** with **washers** securing the **Cutter unit** to the **Cutter holder**.

11. Slide the **Cutter unit** upwards to detach from the **Cutter holder**.

12. Replace the new **Cutter unit** and follow the above steps in reverse sequence, to reassemble the parts.

13. After replacement, perform Cutter counter clear and Cutter Offset position adjustment. Refer to **Section 4.12 Factory Clear Mode** and **Section 6.6 Offset position Adjustment**.



Notes:

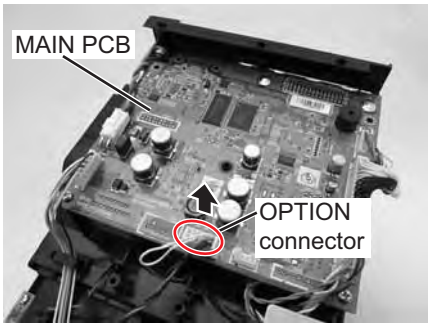
- Ensure the cables are properly route after assembled the parts of **Cutter kit**. Ensure that no cables are pinched between parts when you are installing the cutter board to the printer.
- When pasting the **Anti static sheet**, Top right corner of **Anti static sheet** must meet the cross point as indicated on the right diagram.

7.14 DISPENSER KIT/ ROLLER/ LABEL SENSOR REPLACEMENT (OPTIONAL)

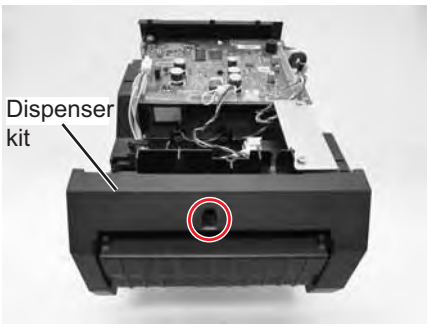
This section covers the basic mechanical procedures for replacement of the Dispenser Kit.

7.14.1 Dispenser kit Replacement

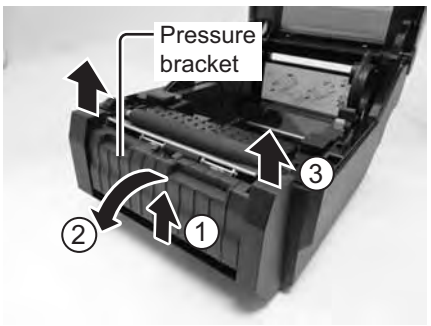
1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Disconnect the **Dispenser kit's cable** from the **OPTION connector** on the **MAIN PCB.**



3. From the base of the **Dispenser kit**, remove a **screw** (circled) as shown.



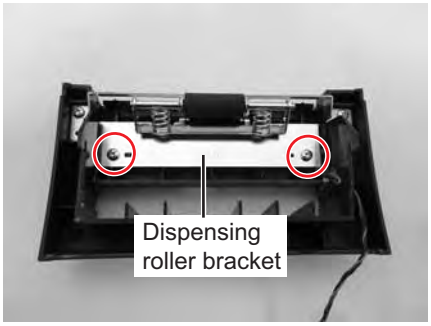
4. Turn over the printer in upright position, open the **Top cover** and remove the **Dispenser kit** by lifting it upward.
5. Replace the new **Dispenser kit** and follow the above steps in reverse sequence, to reassemble the parts.
   Continue the following steps if you required to replace the **Dispenser roller** or **Dispenser label sensor**.



> CAUTION:
> Ensure that no cables are pinched between parts when you are installing the **cutter kit** to the printer.

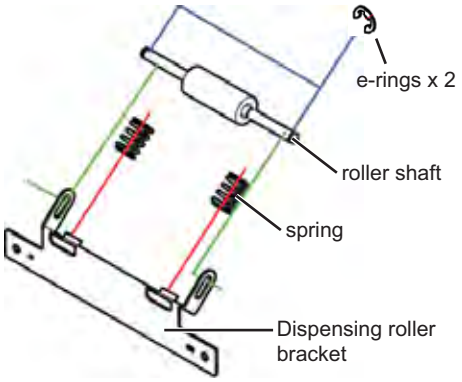
7.14.2 Dispenser roller Replacement

6. From the reverse side of the **Dispenser kit**, remove the two **screws** securing the **Dispensing roller bracket** in place.

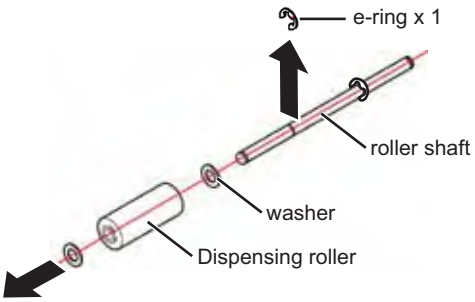


7.14 DISPENSER KIT/ ROLLER/ LABEL SENSOR REPLACEMENT (OPTIONAL) (cont'd)

7. Remove the two **e-rings** from the **shaft** of the **dispenser roller** and slide to detach the **dispenser roller assembly** from the **bracket**.
Keep the loose **springs** and **e-rings** aside for latter use.

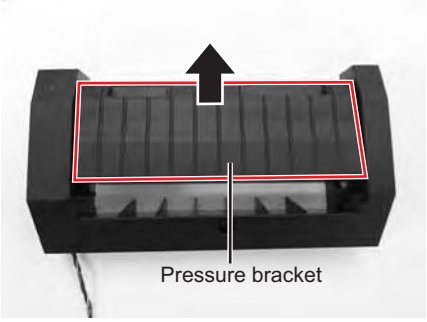


8. Remove one **e-ring** and **washer** from one side of the **dispenser roller assembly**. Slide out the defective **dispenser roller** and replace the new **Dispenser roller.**
Follow the above steps in reverse sequence, to reassemble the parts.
Continue the following steps if you required to replace the **Dispenser label sensor**.



7.14.3 Dispenser label sensor Replacement

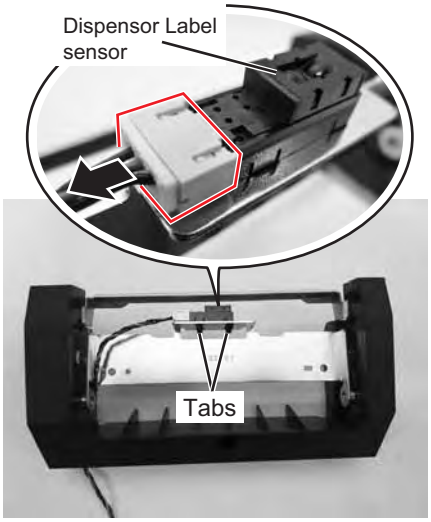
9. Flip over to the front side of **Dispenser kit** and remove the **pressure bracket**, revealing the **Dispenser Label sensor**.



10. Press the **tabs** to release the **Dispenser Label sensor** and remove the **cable** attached to the **connector.**

11. Replace the new **Dispenser Label sensor** and follow the above steps in reverse sequence, to reassemble the parts.

> CAUTION:
> Ensure that no cables are pinched between parts when you are assembling the **pressure bracket** and the **Dispensing roller**; and when you are installing the **Dispenser kit** to the printer.

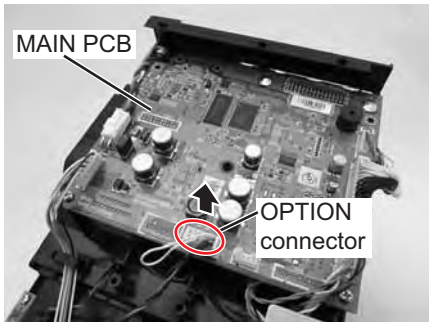


12. After replacement, perform Dispenser Offset position adjustment. Refer to **Section 6.6 Offset position Adjustment**.

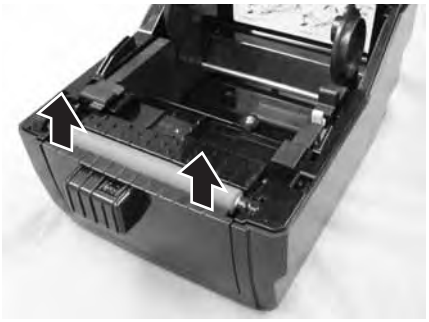
7.15 LINERLESS (NON SEPA) LABEL SENSOR REPLACEMENT (OPTIONAL)

This section covers the basic mechanical procedures for replacement of the Linerless (Non sepa) label sensor.

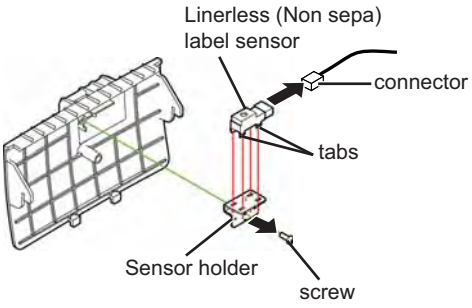
1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Disconnect the **Linerless (Non sepa) label sensor cable** from the **OPTION connector** on the **MAIN PCB**.



3. Turn over the printer in upright position, open the **Top cover** and remove the **Linerless (Non sepa) assembly** by pushing it upward.



4. From the reverse side of the **Linerless (Non sepa) assembly**, remove the **screw** securing the **Linerless (Non sepa) label sensor holder** in place.
5. Press the **tabs** to release the **Linerless (Non sepa) label sensor** and remove the **cable** attached to the **connector**
6. Replace the new **Linerless (Non sepa) label sensor** and follow the above steps in reverse sequence, to reassemble the parts.



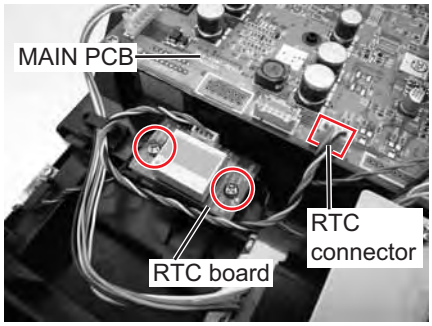
> CAUTION:
> Ensure that no cables are pinched between parts when you are installing the **cutter kit** to the printer.

7. After replacement, perform Tear off offset position adjustment. Refer to **Section 6.6 Offset position Adjustment**.

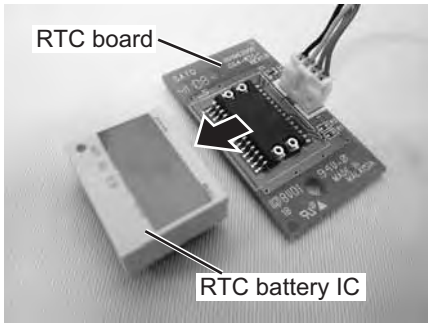
7.16 REAL TIME CLOCK BATTERY REPLACEMENT (OPTIONAL)

This section covers the basic mechanical procedures for replacement of the RTC Kit.

1. Remove the **Bottom Housing Cover** as explained in the earlier **Section 7.3 Removal of the Bottom Housing cover**.
2. Disconnect the **RTC kit's cable** from the **RTC connector** on the **MAIN PCB**.
3. Locate the **RTC board** as shown.
4. Remove two **screws** securing the **RTC board** to the printer.



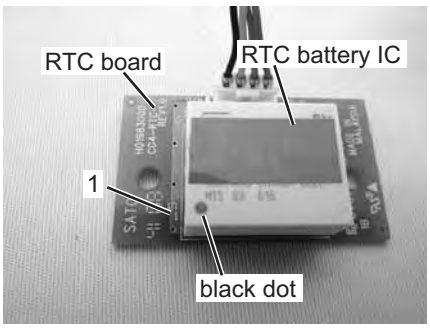
5. Remove the **RTC battery IC** from the board and replace with the new **RTC battery IC**.



6. Follow the above steps in reverse sequence, to reassemble the parts.

Notes:

- When installing the **RTC battery IC**, ensure the orientation is correct. The **black dot** on the corner of the **RTC battery IC** should be align to the marking indicate "**1**" on the **RTC board**.



8

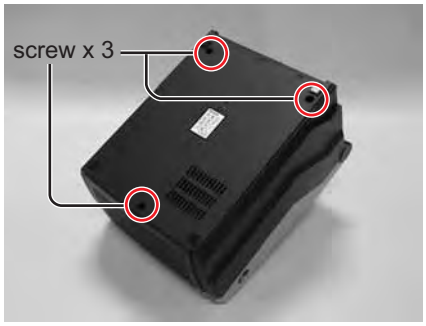
APPENDIX

The following information is provided:

- 8.1 Optional Accessories - Cutter
- 8.2 Optional Accessories - Dispenser
- 8.3 Optional Accessories - Linerless (Non sepa)
- 8.4 Optional Accessories - Real Time Clock (RTC) Kit
- 8.5 Positions of sensors and options
- 8.6 Operation Mode Selection
- 8.7 Base Reference Point
- 8.8 Paper End
- 8.9 Ribbon End

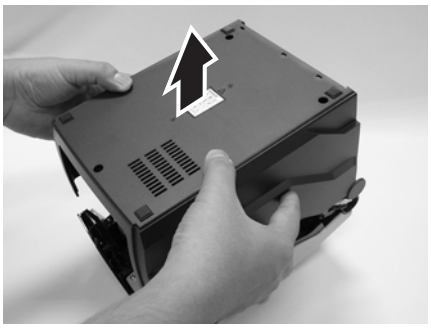
8.1 OPTIONAL ACCESSORIES - CUTTER

8.1.1 To install the optional Cutter

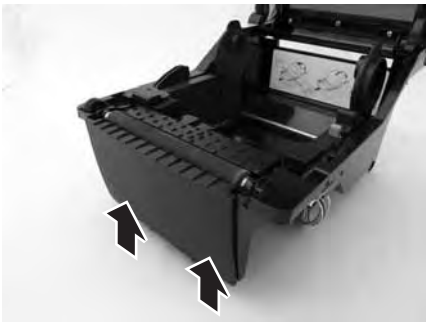


1. Make sure the printer is powered off and disconnect the power cable and interface cable.
2. From the **base** of the printer, remove three **screws** (circled) as shown.

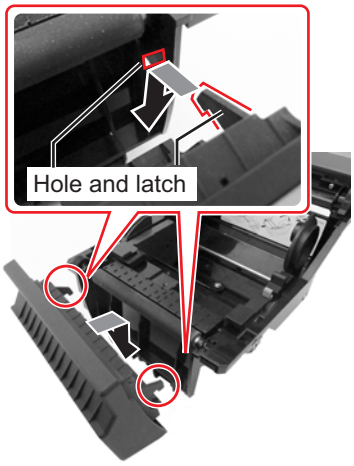
> CAUTION:
> Ensure not to scrape the window portion when the printer is turned over.



3. Remove the **Bottom Housing cover**.



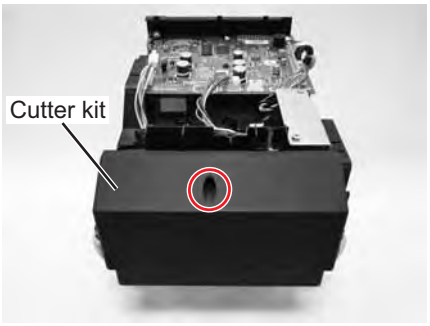
4. Turn over the printer in upright position. Pull the **cover open/close latches** on both sides of the printer toward you to unlock the **Top cover**, and then open the **Top cover**. Remove the **lower front cover** by lifting it upward.



5. Attach the **latches** of the **Cutter kit** onto the **holes** located below the two sides of **platen roller** of the printer. Close the **top cover** and turn the printer over again, with the **Main PCB** is facing upward.

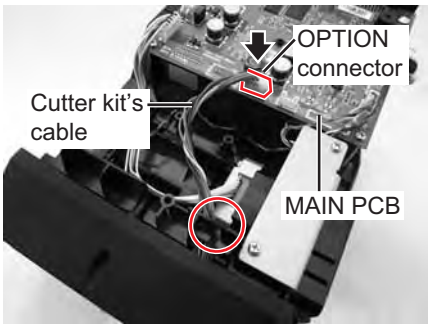
8.1 OPTIONAL ACCESSORIES - CUTTER (cont'd)

6. From the base of the **Cutter kit**, secure the cutter unit to the printer with the supplied **screw** (circled) as shown.



7. Connect the **Cutter kit's cable** to the **OPTION connector** on the **MAIN PCB**.
Route the **Cutter kit's cable** through the **groove** (circled) of the printer as shown.

8. Assemble the **Bottom Housing cover** back to the printer and secure with the three **screws** removed in step 1.



> CAUTION:
> Ensure that no cables are pinched between parts when you are assembling the cover.

8.1.2 To route the media when the cutter is installed

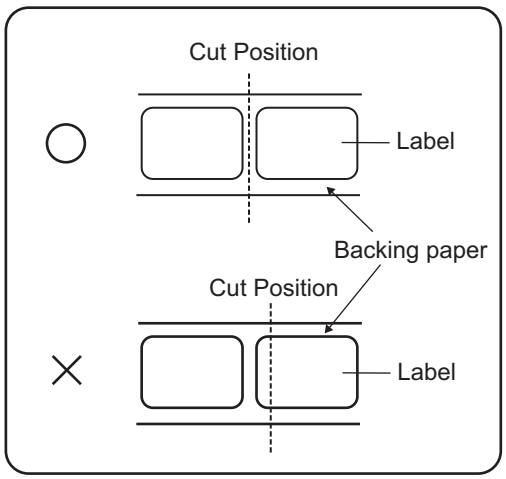
Loading of the media for cutter unit is similar to the usual procedure as explained in **Section 2.3 Loading Labels** of **CG4 Series Operator Manual**.

8.1.3 Cut position Adjustment

If the cutting position is not at the regular position as mentioned below, you can change the **offset setting** with the SBPL commands. Please refer to **Section 6.6 Offset position Adjustment** for the detailed procedures.

Notes when using media with optional cutter

- **Cutting of Labels**
  The correct cutting position is at the label gap. Cutting onto the label must be avoided because the label adhesive that accumulates on the blade will affect cutter sharpness.



8.1 OPTIONAL ACCESSORIES - CUTTER (cont'd)

- **Cutting Media with Perforation**
  As for media with perforation, **cutting on or in front of the perforated lines is prohibited**. Cutting in those locations could cause the media to jam and the printer to malfunction.

  The perforated line +1 mm (+0.04") is the cut prohibited zone (see Figure 1).

  The folded perforated line +4 to +25 mm (+0.15" to +0.98") of fan-folded paper is the cut prohibited zone (see Figure 2).

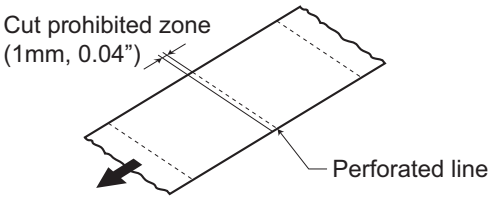


Figure 1

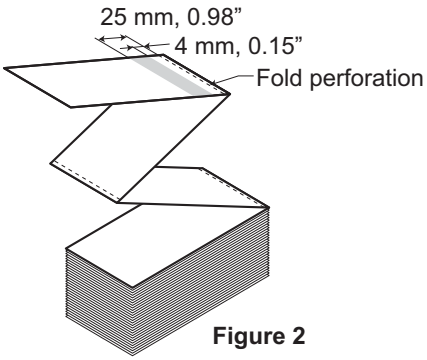
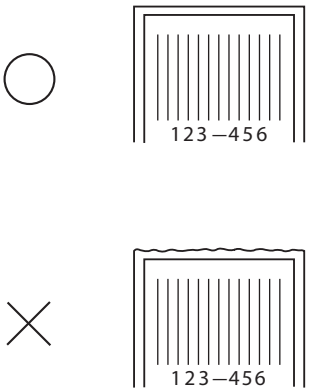


Figure 2

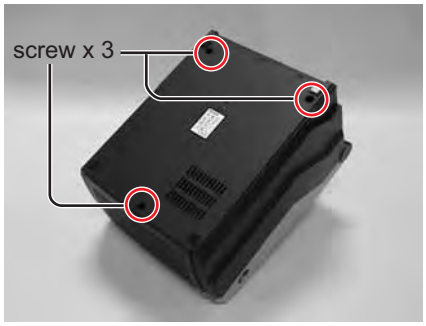
8.1.4 Cutter Unit replacement

Over time, the cutter loses its cutting ability and begins to show signs of wear.
Replace the cutter unit when the blade becomes blunt and cut edges are rough. Please refer to **Section 7.13 Cutter Kit/ Board/Unit Replacement (Optional)** for the detailed procedures.



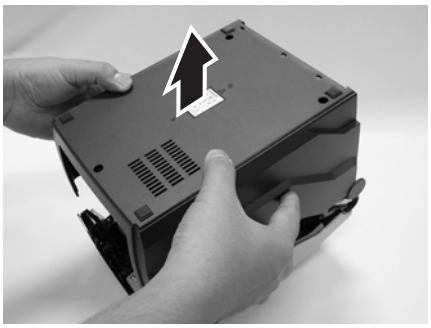
8.2 OPTIONAL ACCESSORIES - DISPENSER

8.2.1 To install the optional Dispenser

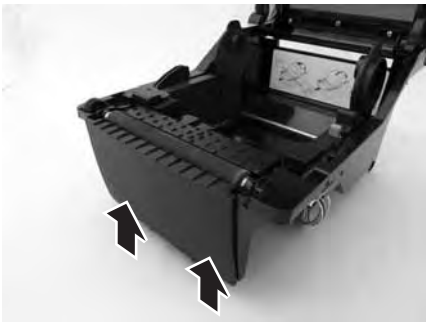


1. Make sure the printer is powered off and disconnect the power cable and interface cable.
2. From the **base** of the printer, remove three **screws** (circled) as shown.

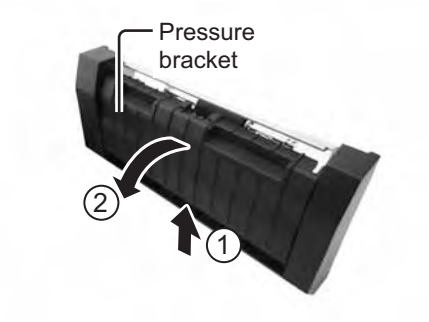
> CAUTION:
> Ensure not to scrape the window portion when the printer is turned over.



3. Remove the **Bottom Housing cover**.



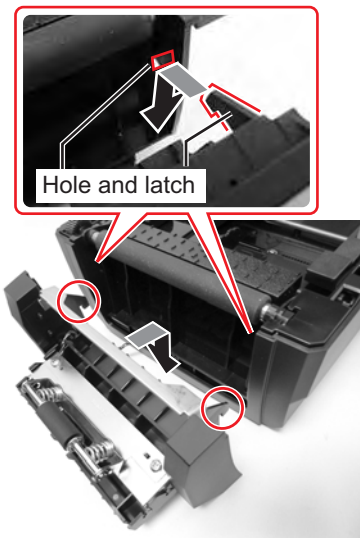
4. Turn over the printer in upright position. Pull the **cover open/close latches** on both sides of the printer toward you to unlock the **Top cover**, and then open the **Top cover**. Remove the **lower front cover** by lifting it upward.



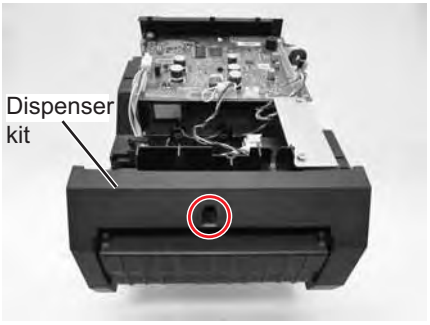
5. Before installing the **Dispenser kit**, open the **Pressure bracket** by lifting upward and outward as shown.

8.2 OPTIONAL ACCESSORIES - DISPENSER (cont'd)

6. Attach the **latches** of the **Dispenser kit** onto the **holes** located below the two sides of **platen roller** of the printer. Close the **top cover**, close the **Pressure bracket** and turn the printer over again, with the **Main PCB** is facing upward.

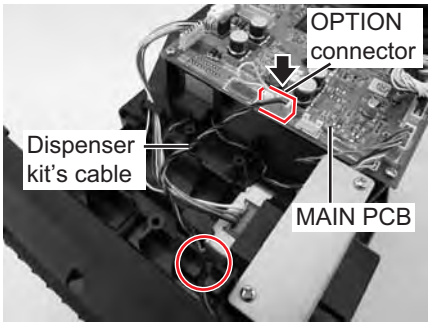


7. From the base of the **Dispenser kit**, secure the cutter unit to the printer with the supplied **screw** (circled) as shown.



8. Connect the **Dispenser kit's cable** to the **OPTION connector** on the **MAIN PCB**.
Route the **Dispenser kit's cable** through the **groove** (circled) of the printer as shown.

9. Assemble the **Bottom Housing cover** back to the printer and secure with the three **screws** removed in **step 1**.



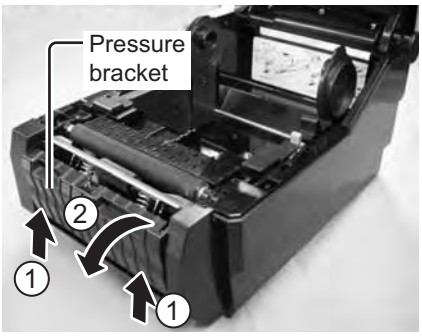
CAUTION:
Ensure that no cables are pinched between parts when you are assembling the cover.

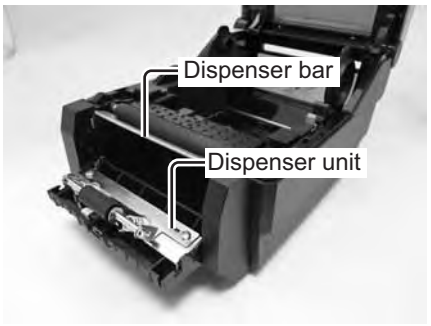
8.2 OPTIONAL ACCESSORIES - DISPENSER (cont'd)

8.2.2 To route the label when the dispenser is installed

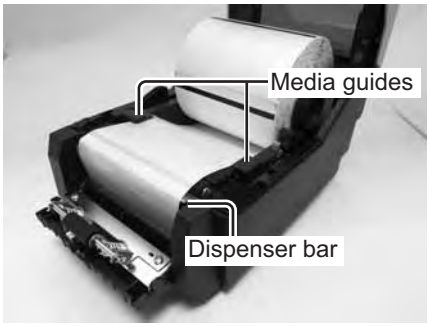
1. With the power supply off, pull the **cover open/close latches** on both sides of the printer toward you to unlock the top cover, and then open the **top cover**. Make sure that the cover rests firmly so that it will not fall forward and injure your hands.

2. With your thumbs positioned on the two corners of the **pressure bracket**, push the **pressure bracket** up and pull it forward to open the **pressure bracket**.

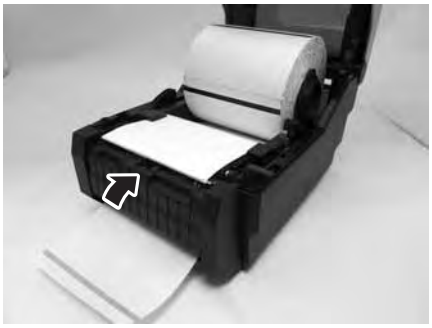




3. Peel off the first two leading labels from the liner (backing paper) and then load the label roll on the **media holder**.
After pulling out the leading liner (backing paper), pass the liner (backing paper) through the **media guides** and then pass over the **dispenser bar** so as to cover it. Then pass the liner (backing paper) under the **pressure bracket** as shown.



4. If the paper is not taut, roll the paper on the **media holder** so that the paper is taut.
Next, tightly close the **pressure bracket** with the liner (backing paper) passing through it.

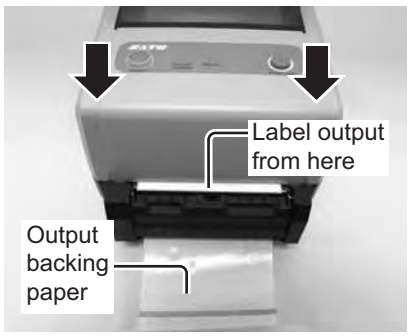


8.2 OPTIONAL ACCESSORIES - DISPENSER (cont'd)

5. Close the **top cover** until it clicks into position.

6. After turning on the label, turn on the power.
The printer is online and the **ON LINE (POWER)** indicator lights green.

When the printer is ready, press the **FEED/LINE** button to output an empty label and stop at the dispenser. This procedure is to ensure that the label is loaded correctly.



8.2.3 Stop position Adjustment

Normally, the label is dispensed to the point where 2 or 3mm (0.08" or 0.1") of the label remain on the liner (backing paper).
If the label is not dispensed at the regular position, you can change the **offset setting** with the SBPL commands. Please refer to **Section 6.6 Offset position Adjustment** for the detailed procedures. After adjusting the stop position, dispense two or three labels to fix the stop position.

Notes:

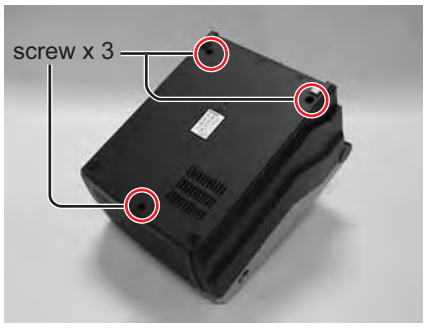
- There may be cases when the dispenser does not function properly due to the thickness of the labels used.
- The Dispenser unit is effective for label pitch 22 to 100 mm (0.86" to 3.93"). However, the label size limitation may vary with application conditions.
- Labels over 100mm (3.9") may curl at dispenser due to the nature of the material. There is no remedy for this.

8.3 OPTIONAL ACCESSORIES - LINERLESS (NON SEPA)

8.3.1 To install the optional Linerless (Non sepa)

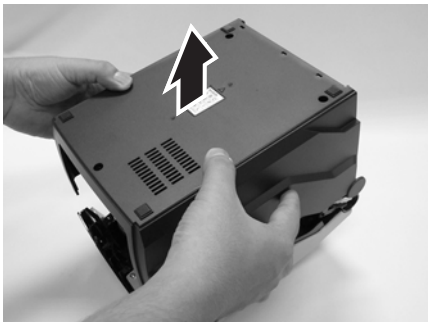
1. Make sure the printer is powered off and disconnect the power cable and interface cable.

2. From the **base** of the printer, remove three **screws** (circled) as shown.



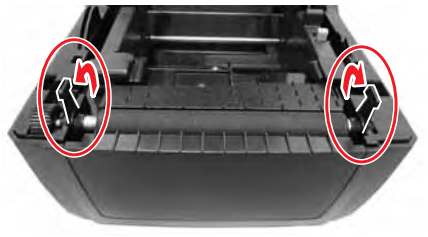
CAUTION:
Ensure not to scrape the window portion when the printer is turned over.

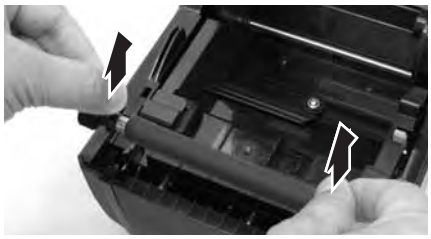
3. Remove the **Bottom Housing cover**.



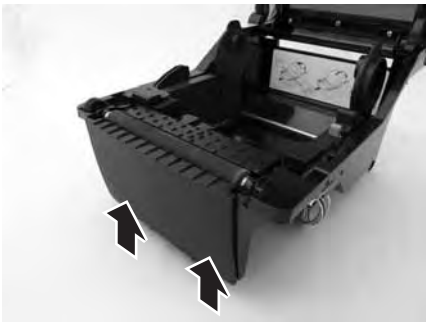
8.3 OPTIONAL ACCESSORIES - LINERLESS (NON SEPA) (cont'd)

4. Turn over the printer in upright position, open the **Top cover** and replace the existing **platen roller** with the **Linerless platen roller**. Refer to **Section 7.2 Platen Roller Replacement** for detailed procedure.



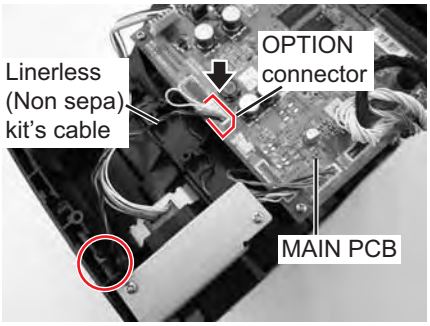


5. Remove the **lower front cover** by lifting it upward.



6. Attach the **latches** of the **Linerless (Non sepa) kit** onto the **holes** located below the two sides of **platen roller** of the printer.
Close the **top cover** and turn the printer over again, with the **Main PCB** is facing upward.

7. Connect the **Linerless (Non sepa) kit's cable** to the **OPTION connector** on the **MAIN PCB**.
Route the **Linerless (Non sepa) kit's cable** through the **groove** (circled) of the printer as shown.

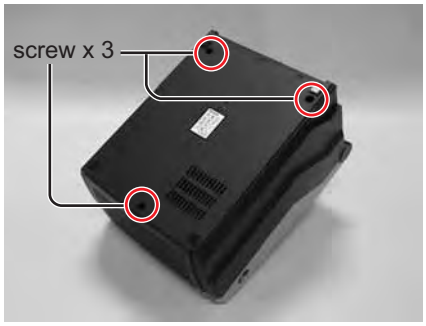


8. Assemble the **Bottom Housing cover** back to the printer and secure with the three **screws** removed in step 1.

> CAUTION:
> Ensure that no cables are pinched between parts when you are assembling the cover.

8.4 OPTIONAL ACCESSORIES - REAL TIME CLOCK (RTC) KIT

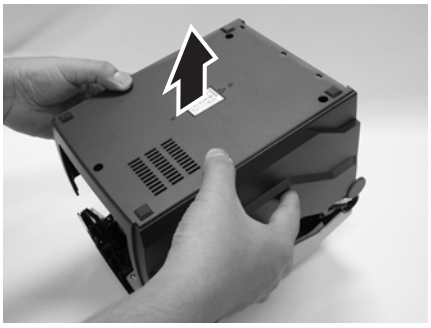
8.4.1 To install the optional RTC kit



1. Make sure the printer is powered off and disconnect the power cable and interface cable.
2. From the **base** of the printer, remove three **screws** (circled) as shown.

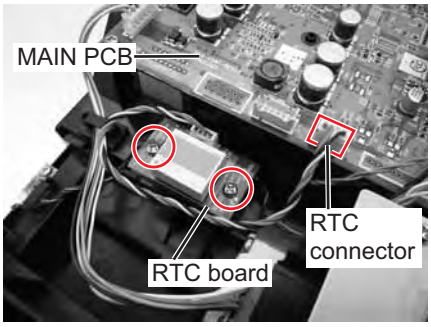
> CAUTION:
> Ensure not to scrape the window portion when the printer is turned over.

3. Remove the **Bottom Housing cover**.



4. Place the **RTC board** on the printer in the position as shown. Secure the **RTC board** with two **supplied screws** to the **bosses** of the printer. Connect the **RTC kit's cable** to the **RTC connector** on the **MAIN PCB**.
5. Assemble the **Bottom Housing cover** back to the printer and secure with the three **screws** removed in step 1.

> CAUTION:
> Ensure that no cables are pinched between parts when you are assembling the cover.

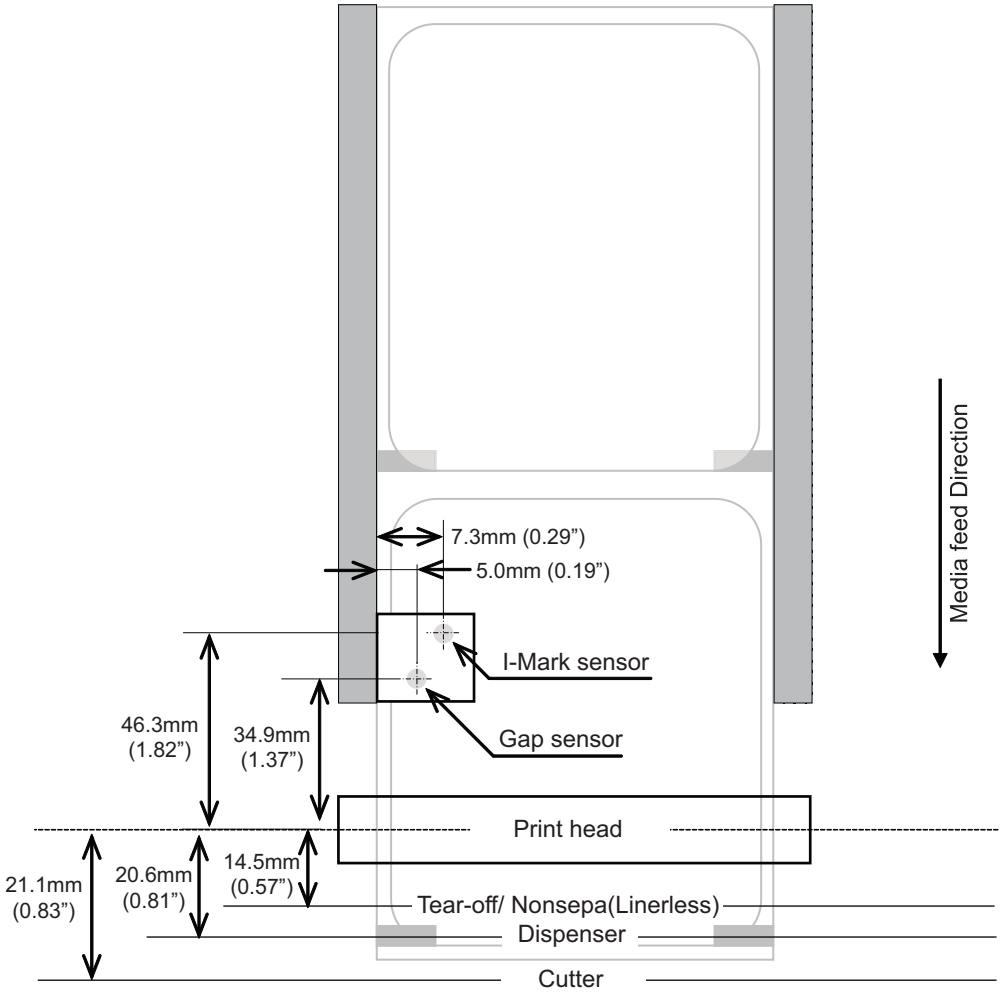


8.4.2 To set the calendar (Date and time) of the optional RTC

1. Send the calendar setting command to set the date and time accordingly as follows.
   Commands:
   <WT>**aabbccddee**
   The defination of the variables are:
   aa: Year (00 to 99), **bb**: Month (01 to 12), **cc**: Day (01 to 31), **dd**: Hour (00 to 23), **ee**: Minute (00 to 59)

   Example: To set the date as year 2010, 6th October and time as 15:29 (3:29 pm).
   <A>
   <WT>1010061529
   <Z>
2. Turn off the printer, and then turn it on again after waiting for 30 seconds or more. (This is to make sure that the battery is working properly.)
3. Send the print data including the calendar print command for printing the date and time.
   Example: <XM><WA>DD/MM/YYhh:mm, please refer to the Programming Manual for more details.
4. Check the print result to be sure that the time and date are printed on the label correctly.
5. If the printed time and date are not correct, repeat the above procedures before replace the RTC kit.

8.5 POSITIONS OF SENSORS AND OPTIONS



8.6 OPERATION MODE SELECTION

There are five modes of printer operation: Continuous, Tear-off, Cutter, Dispense and Linerless (Non sepa) mode. The differences are the ways in which the label and paper backing are ejected. Before printer configuration, one must determine which mode will be used. This section identifies the functional differences among the five.

CONTINUOUS MODE
With this mode of operation, the media remains in position for printing at all times. To do so, means that the previous printed label is only available for removal when one to four additional labels have been printed (quantity depends on label size). This mode of operation is specifically suited for printing bulk quantities to be applied later on.

TEAR-OFF MODE
With this mode of operation, after printing, the printer feeds the first (outermost) label so that it is fully extended out of the printer's front for removal. Printing of the next label will not begin until the prior printed label has been removed. This mode of operation is specifically suited for immediate application at the time of print.
Upon removal of the prior printed label, the printer retracts the media so that the next label in line may be printed, then the printer feeds it. This cycle repeats for each consecutive label.

CUTTER MODE
With the optional cutter unit installed and enabled, this mode of operation will cut individual printed labels or in multiples. The media will be advanced to the cutter blade, the label cut will occur, and the unprinted media will retract for positioning of the next print.

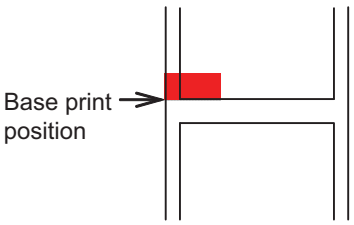
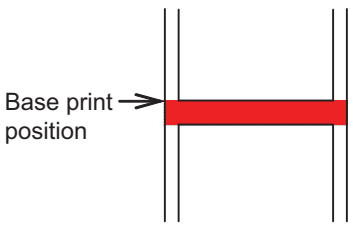
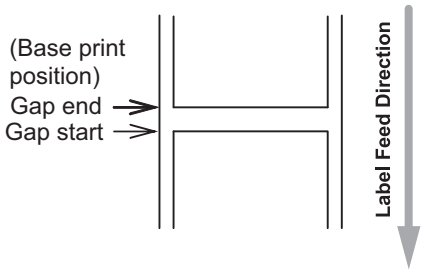
DISPENSE MODE
When the optional dispenser is installed and enabled, this mode of operation will peel the liner (paper backing) from the printed label as it is advanced to the printer's front. Once the printed label has been removed from the printer for application, the unprinted media will retract and position itself so the next label may be printed.
This operational mode is specifically applicable to print operations where the label is to be immediately adhered.

LINERLESS (Non Sepa) MODE
When the linerless option is installed and enabled, this mode of operation allows for the feeding and printing of linerless media. In this mode, the printer's functionality is the same as with the continuous or tear-off modes depending on configuration settings.

8.7 BASE REFERENCE POINT

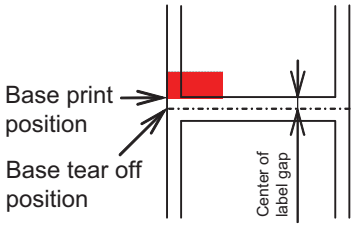
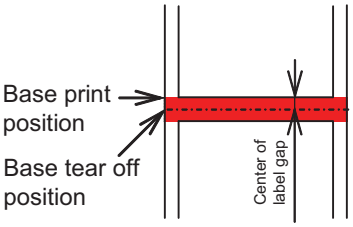
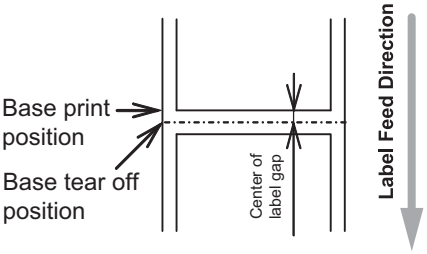
The base reference point is the point at which one determines the print and cut positions.
The base reference position differs, depending on the print mode or the label pitch sensor to be used.

Continuous Mode

I-Mark	I-Mark (CX-compatible)	Gap
		

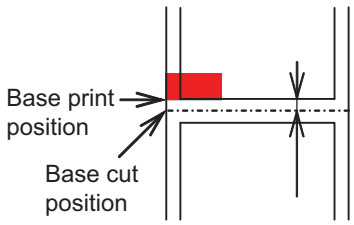
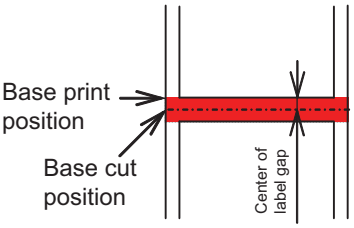
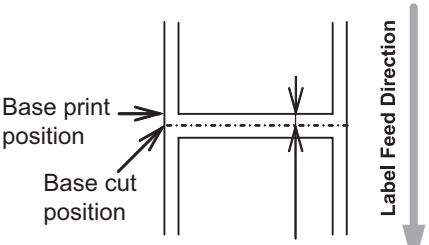
- The start of I-Mark is the base print position when using the I-Mark sensor.
- The end of I-Mark is the base print position when using the I-Mark (CX-compatible) sensor.
- The end of label Gap is the base print position when using the label Gap sensor.

Tear off Mode

I-Mark	I-Mark (CX-compatible)	Gap
		

- The center of label gap is the base tear off position when using the I-Mark sensor.*
- The center of label gap is the base tear off position when using the I-Mark (CX-compatible) sensor.*
- The center of label gap is the base tear off position when using the label Gap sensor.*

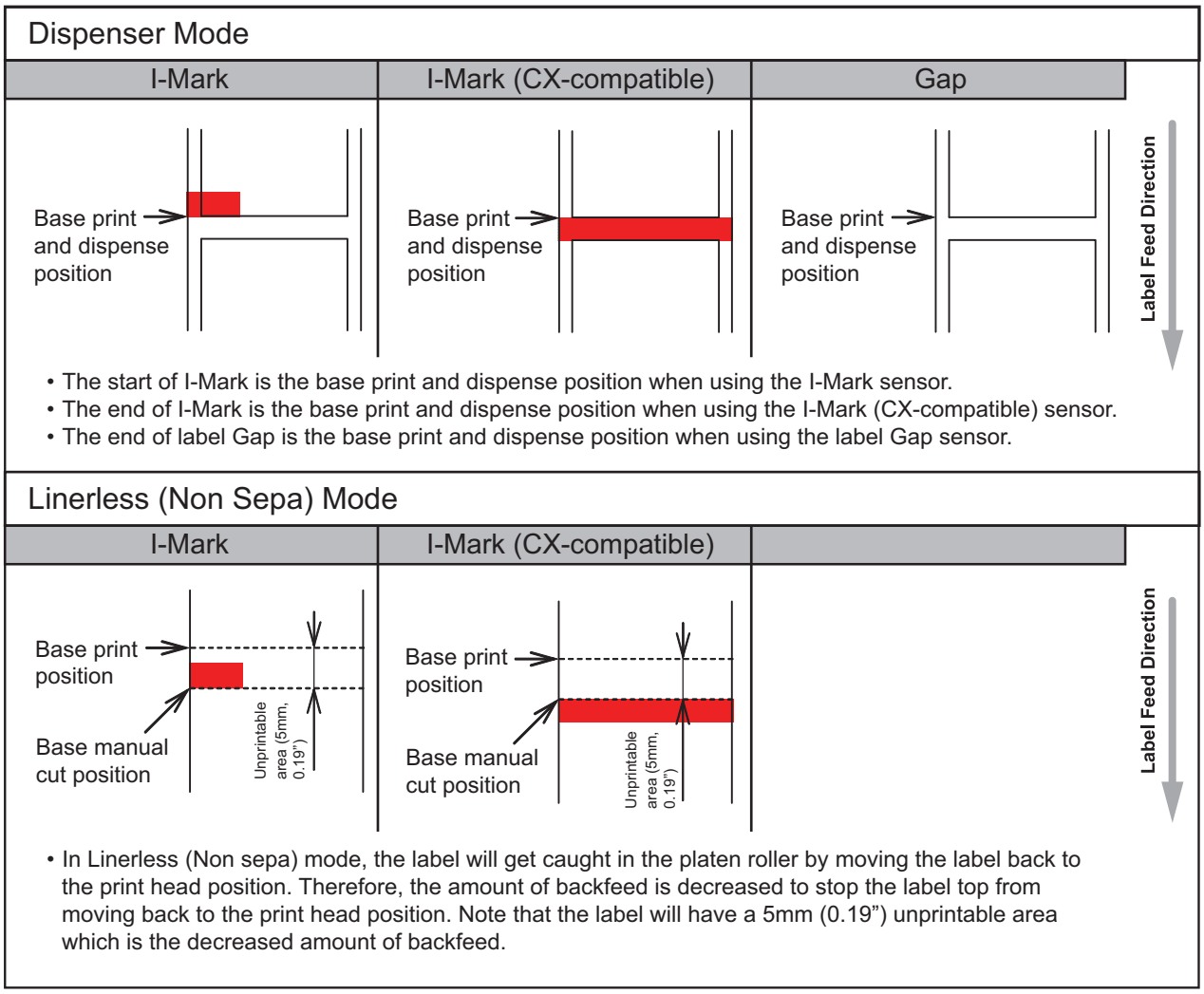
Cutter Mode

I-Mark	I-Mark (CX-compatible)	Gap
		

- The center of label gap is the base cut position when using the I-Mark sensor.*
- The center of label gap is the base cut position when using the I-Mark (CX-compatible) sensor.
- The center of label gap is the base cut position when using the label Gap sensor.*

* Default value of label gap saved in the printer is 3mm (0.12”). Therefore, the distance from the base print position to the center of label gap is 1.5mm (0.06”) (Default value). When the size of label gap is not 3mm (0.12”), use the he <PC> command or the <PG> command to set the gap size properly. For the command details, refer to the Command Reference.

8.7 BASE REFERENCE POINT (cont'd)

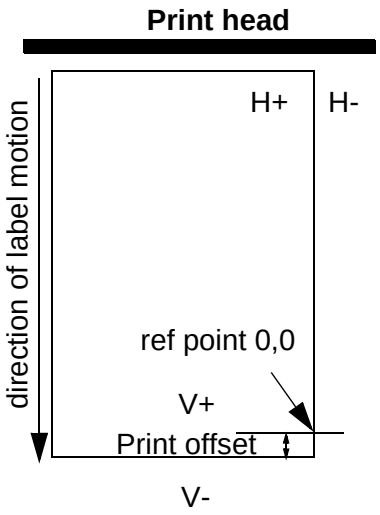

Dispenser Mode
I-Mark
I-Mark (CX-compatible)
Gap
Base print and dispense position
Base print and dispense position
Base print and dispense position
Label Feed Direction
• The start of I-Mark is the base print and dispense position when using the I-Mark sensor.
• The end of I-Mark is the base print and dispense position when using the I-Mark (CX-compatible) sensor.
• The end of label Gap is the base print and dispense position when using the label Gap sensor.
Linerless (Non Sepa) Mode
I-Mark
I-Mark (CX-compatible)
Base print position
Base manual cut position
Unprintable area (5mm, 0.19")
Base print position
Base manual cut position
Unprintable area (5mm, 0.19")
Label Feed Direction
• In Linerless (Non sepa) mode, the label will get caught in the platen roller by moving the label back to the print head position. Therefore, the amount of backfeed is decreased to stop the label top from moving back to the print head position. Note that the label will have a 5mm (0.19") unprintable area which is the decreased amount of backfeed.

8.7.1 Base Reference point Adjustment

Print Position Offset refers to the vertical and horizontal shifting of the entire print area, relative to the start position of printing (V=0, H=0), defined by default to be the bottom right hand corner of the label.

The Base Reference point can be adjusted by using the Printer Utilities Tool application or by sending the <A3> command from the host.

The V setting is for the Vertical print offset. A positive (+) offset means the printing is shifted towards the print head; a negative (-) offset means shifting away from the print head.
The H setting is for the Horizontal print offset. The + or - prefix determines whether the offset is to the left or to the right of the reference point.
The default value of both positions is +000 dot. The maximum values that can be set for each is +/-792 dot.

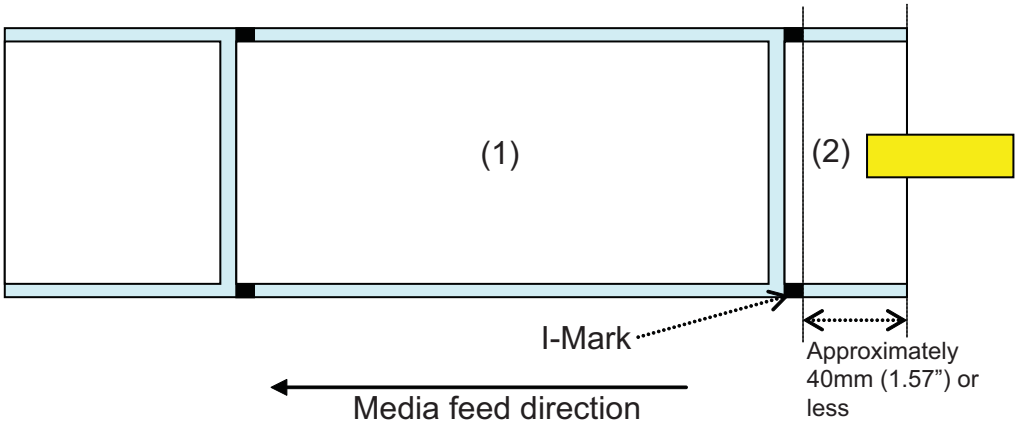


You may wish to make a test print after completing the adjustments to ensure they are correct. Refer to **Section 4.3 User Test Print Mode** for details.

8.8 PAPER END

8.8.1 Roll Label End

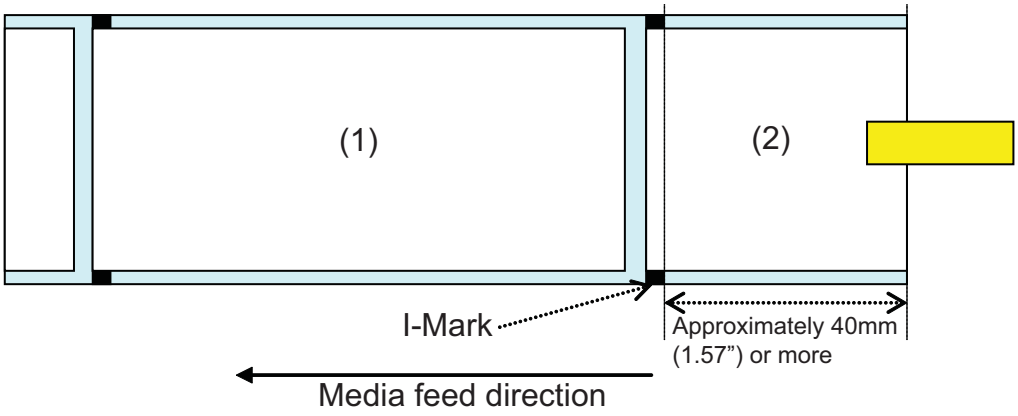
When the Label End is less than 40mm (1.57”) from the end of I-Mark



The printer behavior when paper end is detected is as follows:
- After completing the print of label (1), “Paper end error” will occur.
- In cutter mode, “Paper end error” will occur after cutting the label.
- After releasing the error, Label (1) will not be printed again.

Note:
The paper end detection is performed by the I-Mark sensor, therefore, the above motion may not occur depending on the adjustment of the I-Mark sensor.

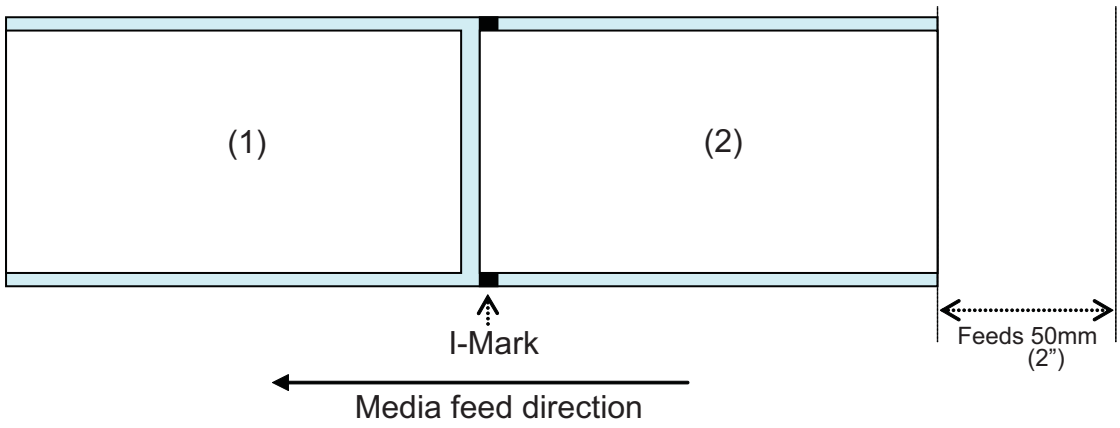
When the Label End is More Than 40mm (1.57”) from the end of I-Mark



The printer behavior when paper end is detected is as follows:
- “Paper end error” will occur while printing the label (2).
- If an error occurs while printing, label (2) will be printed again after releasing the error. If the print job is completed at the time of error occurrence, label (2) will not be printed again.
- In cutter mode, cutting motion will not occur when the printer has a “Paper end error.”

Note:
The paper end detection is performed by the I-Mark sensor, therefore, the above motion may not occur depending on the adjustment of the I-Mark sensor.

8.8.2 Fanfold Label End



The printer behavior when paper end is detected is as follows:
- After printing and feeding label (2) 50mm (2"), "Paper end error" will occur.
- If an error occurs while printing, label (2) will be printed again after releasing the error. If the print job is completed at the time of error occurrence, label (2) will not be printed again. (Also, when the print job is completed while feeding the label 50mm (2"), the label will not be reprinted.)
- In cutter mode, cutting motion will not occur when the printer has a "Paper end error."

Note:
The paper end detection is performed by the I-Mark sensor, therefore, the above motion may not occur depending on the adjustment of the I-Mark sensor.

8.9 RIBBON END

Ribbon End detection is only available for CG408TT and CG412TT printers.

Printer behavior when ribbon near end is detected is as follows:
- Ribbon near end can be detected by setting printing method to thermal transfer.
- When the ribbon remaining becomes 5 to 7m (16.4 ft. to 22.9 ft.), "Ribbon near end" will be detected. The status of ribbon near end will be returned if status request (ENQ) is made.

Printer behavior when ribbon end is detected:
- Ribbon end can be detected by setting printing method to thermal transfer.
- If the print job is completed at the time of "Ribbon end error", the label will not be printed again after releasing the error.
- If "Ribbon end error" occurs while printing, the label will be printed again after releasing the error.

9

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